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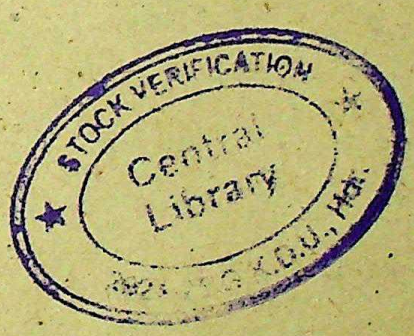

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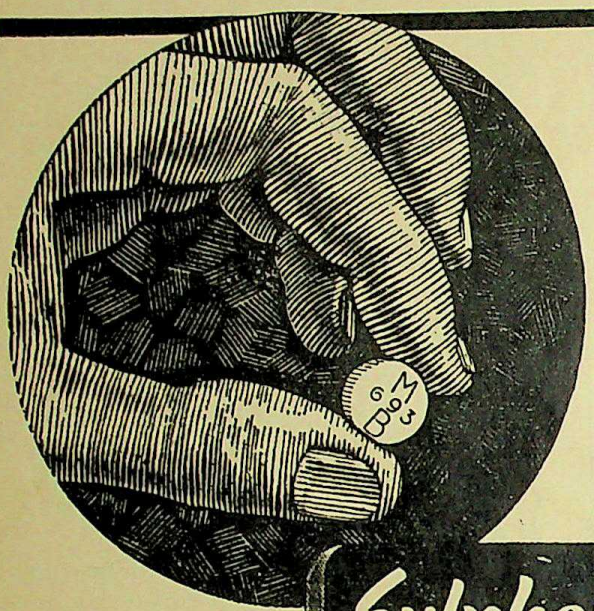

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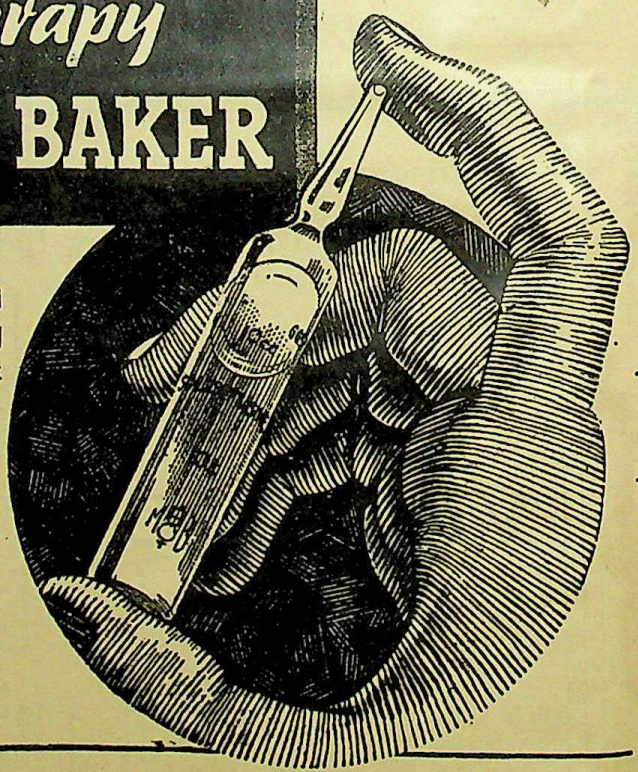

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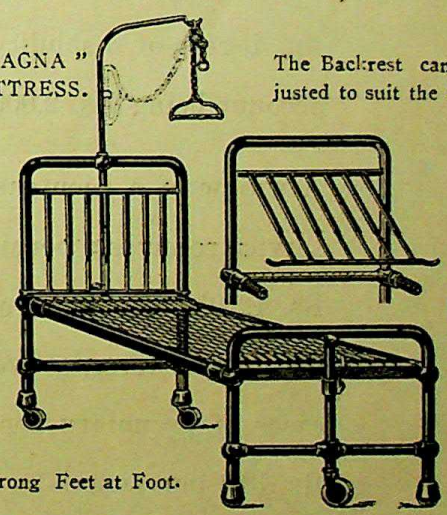

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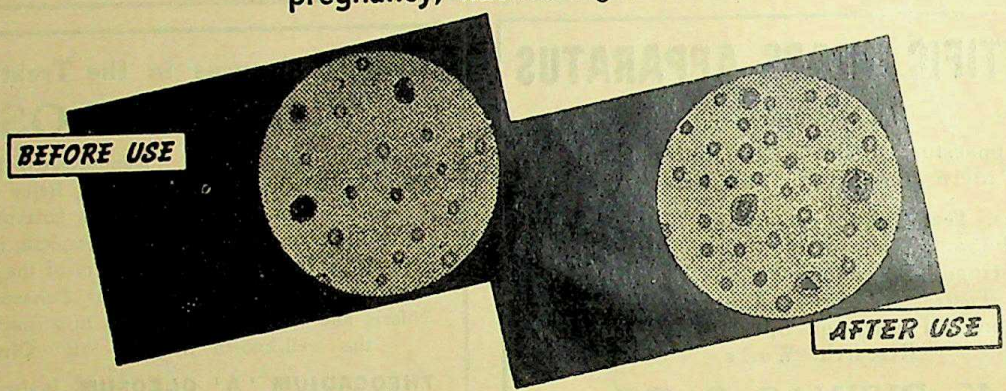

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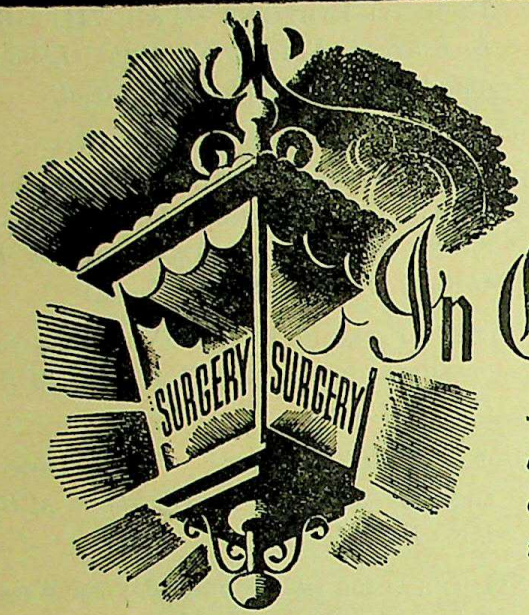

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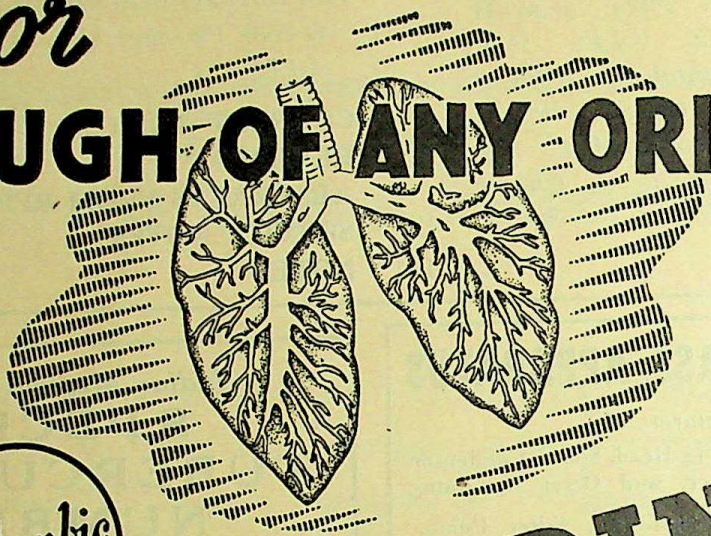

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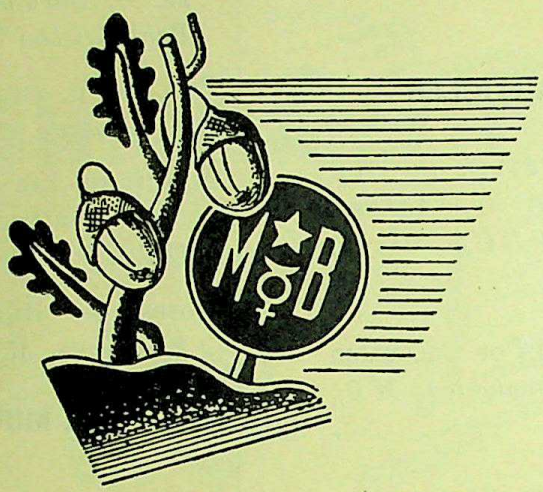

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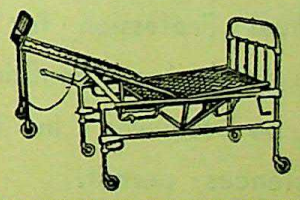

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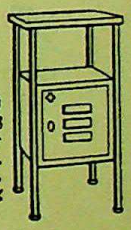

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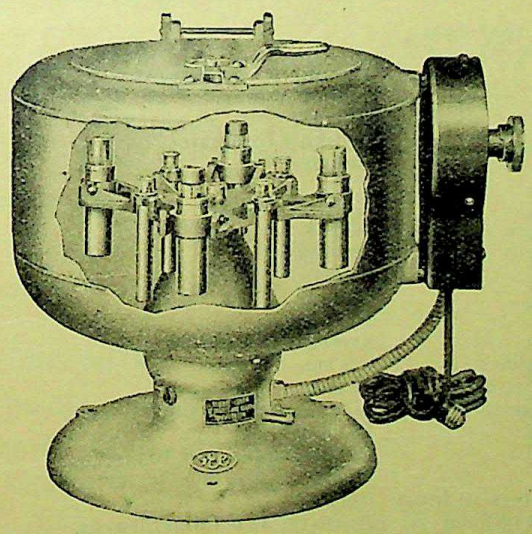

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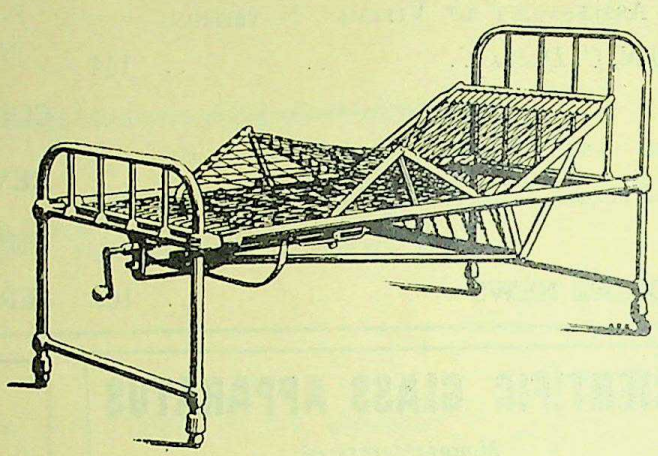

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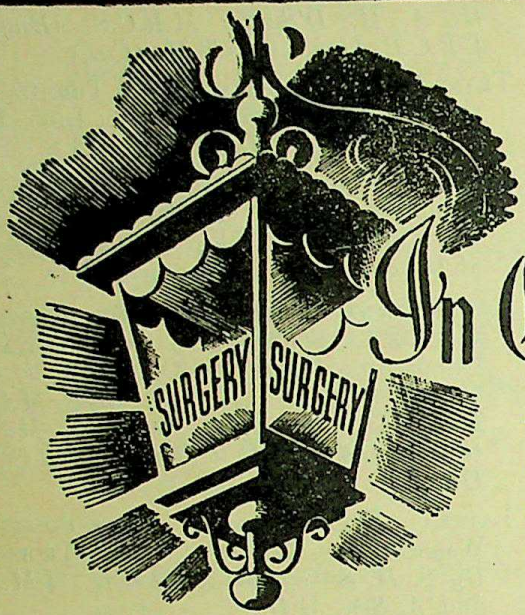

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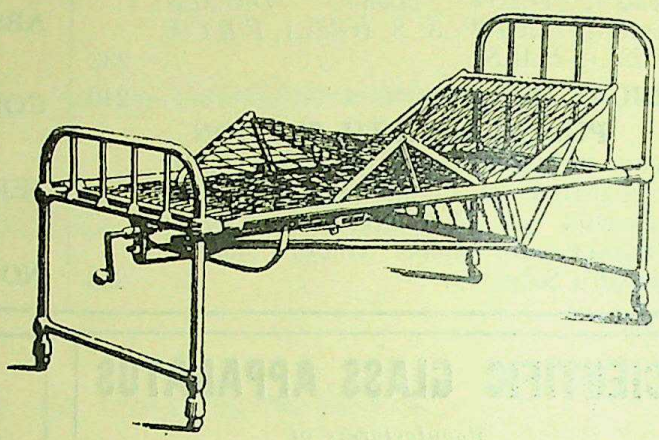

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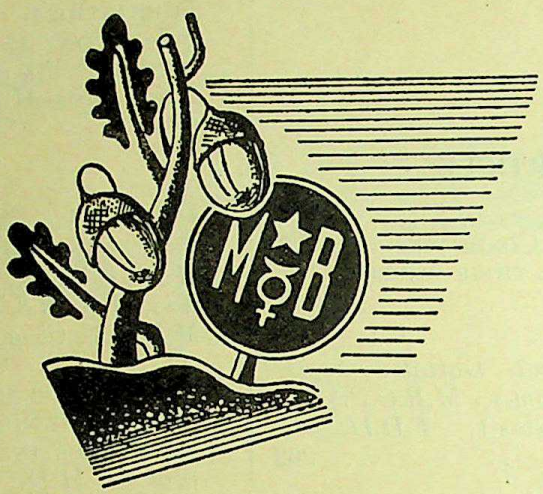

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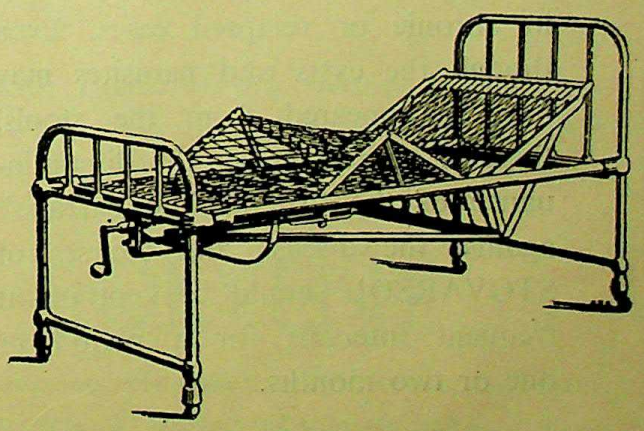

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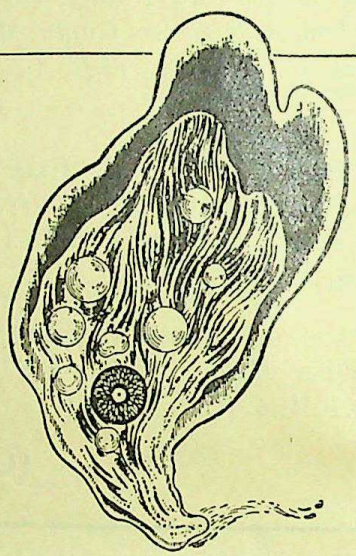

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Original Articles

SUPERFICIAL KERATITIS DUE TO RIBOFLAVIN DEFICIENCY

By W. R. AYKROYD, M.D., SC.D.
Director, Nutrition Research, Indian Research Fund Association
and
O. P. VERMA, M.B., B.S.
Field Worker attached to the Nutrition Research Laboratories
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RIBOFLAVIN is a member of the B_2 group of vitamins, the importance of which in human nutrition is being increasingly realized. Riboflavin deficiency in man was first observed in the United States of America, by Sebrell and Butler (1938, 1939). These workers reported the experimental production in human subjects

CORRIGENDUM

IN the article 'Hæmatological Technique' by Napier and Das Gupta (December 1941 number of the *Gazette*, p. 742) Figure 4 was inverted after the final proof was passed.

Oden, Oden and Sebrell (1939) observed a similar condition in three hospital patients, who were successfully treated with riboflavin. The condition was called 'ariboflavinosis'.

Kruse, Sydenstricker, Sebrell and Cleckley (1940) reported the occurrence of superficial keratitis in cases showing other signs of riboflavin deficiency. Nine cases were observed in this investigation and later the authors (Sydenstricker, Sebrell, Cleckley and Kruse, 1940) reported a further series of 47 cases of superficial keratitis. They observed that the keratitis disappeared in a few days, on the administration of pure synthetic riboflavin. In the same year, Hou (1940), working in Shanghai, described the successful treatment of 36 cases of the same nature.

Typical poor Indian rice diets are deficient in riboflavin, and conditions probably associated with riboflavin deficiency have previously been observed in India. We shall refer to these later. Superficial keratitis responding to vitamin treatment has not hitherto been described by workers in India, but we felt that this condition, if looked for, would readily be found.

Investigation

This was carried out in the Government Ophthalmic Hospital, Madras, where facilities were kindly provided by the superintendent and his colleagues. The staff of the hospital was asked to refer to us for observation and treatment cases in which angular stomatitis was present in conjunction with any eye condition. The investigation lasted three months and during this period many cases of superficial keratitis with angular stomatitis were referred from the outpatient department. From among these, 13 cases in all were treated with riboflavin, with striking and immediate results. The series were limited by the difficulty, at the time when the investigation was in progress, of obtaining further supplies of the pure vitamin.

Cases observed and treated.—Of the 13 cases 8 were males and 5 were females, with ages ranging from 8 to 60. While the condition occurs at all ages, there appears to be some tendency for it to be most common in young men and women in their teens; the majority of treated and untreated cases fell into this age group. All 13 patients belonged to the poorer classes, the average reported income of the families of which they were members being Rs. 14 per month. Their diet, according to replies given by them, consisted mainly of rice with no milk and very small quantities of pulses and vegetables—*i.e.*, a diet low in riboflavin.

Ocular symptoms and signs.—The patients complained of a burning sensation in the eyes, with mistiness of vision, photophobia and watering. A thick exudate was complained of by some cases. In the majority, examination revealed circum-corneal injection; in a few very early cases this was not evident. In all that showed circum-corneal injection there were opacities in the cornea, in some instances visible on direct inspection and in others only by oblique illumination. The opacities consisted of dots or streaks in the superficial layers of the cornea, some of which stained faintly with fluorescin. In some cases superficial ulcers could be plainly seen. The keratitis does not appear to show any tendency to progress into the deeper layers. It is very resistant to ordinary local treatment as usually applied in hospital. Vascularization of the cornea was present in only three cases.

The conjunctivæ were usually 'dirty' and pigmented. A few cases showed general conjunctival congestion but in the majority congestion was confined to the angles. Phlyctenular conjunctivitis was present in one case and severe blepharitis in another. The latter case did not show acute keratitis, but corneal opacities were present.

Retinoscopy was not carried out because this requires the application of atropine. The latter is part of the routine treatment of keratitis and the object of the investigation was to observe the effect of riboflavin alone without accessory methods of treatment. The fundus, as far as it could be observed through the undilated pupil, was normal. The iris was normal and active in all cases.

Other signs.—All showed angular stomatitis of varying degree. The tongue was fissured, but the 'magenta' colour described by the American workers as a feature of 'ariboflavinosis' was not observed. Most patients complained of a burning sensation in the mouth when food was taken. Again, contrary to the American observations,

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cheilosis was not a prominent feature. In two cases there was a seborrhœic dermatitis of the face with multiple comedones. In one case a big wet wart was present on the lower lip; this disappeared completely on treatment with riboflavin. All the male cases, on being questioned, complained of itchiness of the scrotum and examination showed that the skin over the scrotum exhibited roughness and scaliness in varying degree. The duration of the symptoms in the different cases varied from 4 days to 18 months.

Treatment.—All cases were dealt with as out-door patients. The patients were not advised to change their diets, and local treatment for the eyes, mouth and scrotum was not given. The only treatment was by intramuscular injections of 'lactoflavin, B.D.H.' (*N.B.*—Lactoflavin and riboflavin are equivalent terms; the latter is now, however, generally employed. The shorter word 'flavin' has also been employed by some workers.) In most cases an initial injection of 2 milligrammes was given followed at daily intervals by further injections of one or two mg. The amount of riboflavin injected varied from 5 to 24 mg., according to the severity of the case.

Results.—Within 24 to 48 hours the pain and burning sensation in the eyes markedly decreased and in 3 to 12 days all subjective eye symptoms disappeared. The objective signs of acute superficial keratitis and angular conjunctivitis vanished within this period. While minute superficial streaks and opacities disappeared and with them dimness of vision in most cases, some of the larger opacities persisted after 12 days of treatment. Possibly the larger opacities would yield to more prolonged treatment. In this investigation, however, enough of the pure vitamin was not available for such treatment, and further the treatment was limited because of the very considerable expense of the injections.

After 2 to 3 injections, burning in the mouth was no longer complained of. The tongue fissures usually became very much less evident or altogether disappeared after the administration of about 10 milligrammes of the vitamin. Angular stomatitis took longer to disappear. Scrotal itching vanished, but in most cases the skin of the scrotum did not return to normal during the period of treatment. In one case, however, in which treatment was prolonged and 24 milligrammes given, the scrotal skin became smooth.

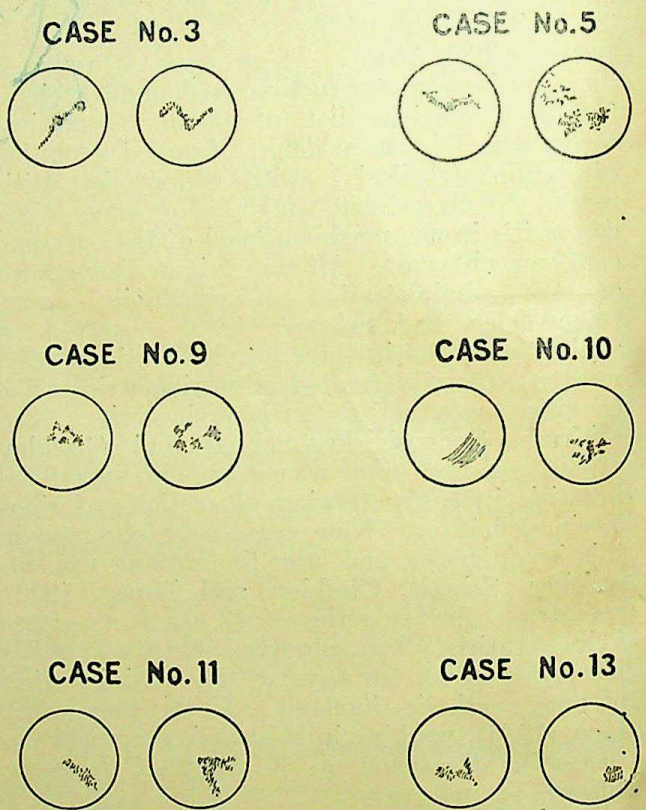
A most important observation was that signs of riboflavin deficiency tended to recur within a short period after the administration of the vitamin had ceased.

The table shows the results of treatment, while the figure indicates the position of the opacities in 6 cases. The photograph shows a typical case. The fissuring of the tongue and the photophobia are brought out.

Illustrative cases

Case 1.—Male, aged 18 years. Complained of photophobia and watering in both eyes for 18 months, with 'weakness of vision' for 2 years. His vision was R.E. 6/36 and L.E. 3/60. His left eye showed two small nebulæ in the centre of the left cornea with marginal superficial keratitis staining with fluorescin at the lower margin and vascularization. The right cornea was clear. He had marked angular stomatitis and a fissured tongue. His scrotum was dry, scaly and very itchy. There was a wet wart on the lower lip. He was given injections of 2 mg. of lactoflavin daily for 5 days. The keratitis subsided and the irritative eye symptoms disappeared. Vision became R.E. 6/18 partial and L.E. 6/36. The opacities did not, however, disappear completely. The wart on the lower lip dried up and the lip became smooth. Itching of the scrotum subsided but roughness and scaliness persisted. Treatment was stopped after 6 days. The patient returned in 11 days complaining of some photophobia and itching of the skin of the scrotum again. He was given 1 mg. of lactoflavin daily for another 5 days and these symptoms again disappeared.

Case 2.—Male, aged 17 years. Complained of photophobia, burning and watering in the eyes for 3 weeks and 'misty vision' for 3 months. The eyes showed circum-corneal congestion, very marked in the left eye.



Position of corneal opacities in six cases.

The left cornea had a superficial ulcer and a central opacity. Marked angular stomatitis, fissured tongue, and a rough and scaly scrotum were present. Treatment with 2 mg. of lactoflavin daily was started. After 12 days of treatment the ulcer was healed and no opacity remained in its place. The 'mistiness of vision' disappeared, but the central opacity did not vanish completely. The mouth, tongue and scrotal lesions were completely healed. The patient returned complaining of photophobia and 'mistiness of vision' 15 days after treatment ceased.

Case 3.—Male, aged 8 years. Complained of severe photophobia, burning, watering and defective vision at night for 20 days. He also complained of burning in the mouth while eating. Circum-corneal congestion and angular conjunctivitis were present, and there was marked xerosis of the conjunctivæ. The cornea in both eyes showed superficial opacities and keratitis. Angular stomatitis and fissured tongue were present. The skin of the scrotum was smooth. He was given lactoflavin injections, 2 mg. daily. In 5 days all

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symptoms had disappeared. The cornea became clear but the xerosis persisted.

Case 4.—Male, aged 15 years. Complained of photophobia, burning and watering in both eyes for 4 months. He showed no corneal lesions, while the conjunctivæ were pigmented but free from congestion. There was seborrhœic dermatitis of the face with multiple comedones in the naso-labial angles, and fairly severe angular stomatitis and a fissured tongue were present. He was given an initial injection of 2 mg. of riboflavin, followed by 1 mg. daily for 10 days. The eye symptoms disappeared completely. The seborrhœa and the angular stomatitis were much improved.

Case 5.—Male, aged 17 years. Complained of itching and soreness of the angles of the eyes, with sticking together of the lids in the morning. There was slight congestion of the vessels in the angles of the bulbar conjunctivæ and superficial corneal opacities in both eyes. Ulcerative blepharitis was present. This patient had some angular stomatitis, a fissured tongue and seborrhœic scales in the eyebrows. The skin of the scrotum was rough, scaly and itchy. He was treated with lactoflavin, 2 mg. intramuscularly for 12 days. The blepharitis and the exudate disappeared. The angular stomatitis was completely cured and the scrotal skin became smooth. This patient had previously been refused for the army, but after treatment was accepted as a recruit.

Discussion

Superficial keratitis, as described in this paper, associated with other signs and symptoms of vitamin-B_2 deficiency, is probably a common condition in India. During the investigation in the Ophthalmic Hospital, Madras, many more cases than could be treated were encountered. According to the latest triennial report of the hospital, 300 to 400 cases of superficial keratitis of 'unknown origin' were treated annually in recent years. Probably numerous cases apply to out-patient departments in hospitals in other parts of India.

The relation between superficial keratitis associated with riboflavin deficiency and various types of keratitis referred to in the literature is not clear. Elliot (1920) remarks that superficial punctate keratitis is very common in eastern countries, but offers no suggestions as to ætiology. Herbert (1901) reported an 'epidemic' of superficial keratitis in Bombay in 1900, but the appearances of the lesions in his cases differed in various respects from those observed in the present investigation. Kirkpatrick (1920) described an outbreak of superficial punctate keratitis in Madras—a condition commonly known as 'Madras eye'. 'Madras eye' is said to affect all classes and communities including Europeans and may or may not be the same disease.

A number of investigations on vitamin-B_2 deficiency in human beings has been carried out in India. Aykroyd and Krishnan (1936) described angular stomatitis and glossitis in malnourished children. Eye lesions were not observed in these cases. They reported that the administration of milk or yeast produced a rapid cure, and suggested that the condition might be due to riboflavin deficiency. Milk and yeast are both rich in riboflavin. In later investigations it was found that improvement in some cases of stomatitis, particularly those showing marked glossitis, could be obtained by the administration of alkaline autoclaved yeast, presumably devoid of riboflavin and also by nicotinic acid (Aykroyd and Krishnan, 1938 and Aykroyd, Krishnan and Passmore, 1939). Nair (1939) and Karunakaran and Nair (1940) have described syndromes in which glossitis and scrotal lesions were prominent, but again without apparent involvement of the eyes. The former gave the name 'oro-genital syndrome' to the condition observed by him. Karunakaran and Nair reported that milk and marmite, but not nicotinic acid, had a curative effect.

There may be certain cases of stomatitis, in which marked glossitis and no eye lesions are present, in which the emphasis is on nicotinic-acid deficiency. This would fit in with the observations of Katzenellenbogen (1939) in Palestine and the experience of Manson-Bahr (1941). The former observed in Palestine a condition which he called 'epidemic glossitis', responding to treatment with nicotinic acid, while the latter concludes that nicotinic acid is effective in the treatment of various kinds of stomatitis. Cases of stomatitis with marked concurrent scrotal lesions (*e.g.*, Govinda Nair's 'oro-genital syndrome' and the cases of Karunakaran and Nair) will probably respond to treatment with riboflavin. It is not clear why some cases of 'orogenital syndrome' show keratitis and not others.

We have remarked on the tendency for the eye lesions to recur within a short time after treatment with riboflavin is stopped. One probable reason for this is the rapidity with which pure riboflavin given in amounts in excess of those present in ordinary diets is excreted, and the high percentage of excretion. In a preliminary investigation in the laboratories (Swaminathan, *in press*) it has been found that in a normal individual as much as 80 to 90 per cent of oral doses of pure riboflavin (2–10 mg.) may be excreted within 24 hours. Excretion in cases of riboflavin deficiency has not yet been studied.

It is at present very difficult to devise a cheap diet of the Indian type, reasonably rich in the vitamin, which could be recommended to patients suffering from 'ariboflavinosis'. A satisfactory fluorimetric method for estimating riboflavin in foods has recently been worked out in the laboratories (Swaminathan, *in press*). It has been found that common Indian cereals, pulses and vegetables are poor sources of the vitamin. The only really potent sources among foods, as far as is at present known, are milk, liver and yeast. A liberal intake of milk is beyond the means of the poor in South India and liver is not a customary food. Dried yeast is at present expensive and supplies are limited. The production of dried yeast from molasses on a large scale might be a solution, provided such a product was sufficiently cheap. Patients on discharge from hospital could be advised to take a small quantity of dried yeast daily. It is possible, but not at all probable, that further study

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TABLE

The results of treating superficial keratitis with riboflavin

Serial number	Age and sex	Amount of lacto-flavin injected, in milli-grammes	Days under treat-ment	Diagnosis	Result	REMARKS
1	18, M.	10	5	Superficial keratitis	Symptoms and signs disappeared. Some opacities persisted.	Came back after 11 days with return of symptoms and was given treatment for a further 5 days. Symptoms again dis-appeared.
2	17, M.	24	12	Do.	Do.	Came back after 15 days with photophobia and mistiness of vision.
3	8, M.	8	5	Superficial keratitis and angular conjunctivitis.	Complete disappearance of signs and symptoms, including opacities.	
4	15, M.	4	3	No objective signs	Symptoms disappeared	Patient complained of photophobia, burning and watering.
5	30, F.	14	7	Superficial keratitis	Superficial keratitis disappeared. Small opacities persisted in left eye.	Came back after 12 days with a return of symp-toms.
6	60, F.	7	4	Do.	Symptoms and signs disappeared. Small opacities persisted.	
7	19, M.	6	3	Superficial keratitis and angular conjunctivitis.	Symptoms and signs disappeared, including opacities.	
8	12, M.	12	6	Superficial keratitis	Do.	
9	20, M.	16	8	Do.	Symptoms and signs dis-appeared. Opacities persisted.	Came back after 9 days with photophobia and watering and was given 4 days' further treatment (4 mg.). Improvement as before.
10	18, F.	6	3	Do.	Symptoms and signs disappeared.	
11	22, F.	16	10	Superficial keratitis and angular conjunctivitis.	Do.	Came back after 10 days with same signs.
12	9, F.C.	7	4	Superficial keratitis and phlyctenular conjunc-tivitis.	Do.	
13	17, M.	24	12	Blepharitis with corneal opacities.	Blepharitis cured. Opacities persisted.	

of the riboflavin content of Indian foods may bring to light some other foods which are fairly good sources of the vitamin and at the same time cheap and easily available.

Summary

1. Superficial keratitis associated with stomatitis and scaly dermatitis of the scrotum has been observed in South India.

2. Treatment by injection of riboflavin produced a rapid disappearance of signs and symptoms in 13 cases. A tendency to recurrence after the cessation of treatment was observed.

Acknowledgments

We are grateful to the superintendent of the Government Ophthalmic Hospital, Madras, Rao Bahadur Dr. K. Koman Nair, Dr. R. E. S. Muthayya, R.M.O., and other members of the staff, for their co-operation in this investigation.

REFERENCES

AYKROYD, W. R., and KRISHNAN, B. G. (1936). *Indian J. Med. Res.*, **23**, 741.

Idem (1938). *Ibid.*, **25**, 643.

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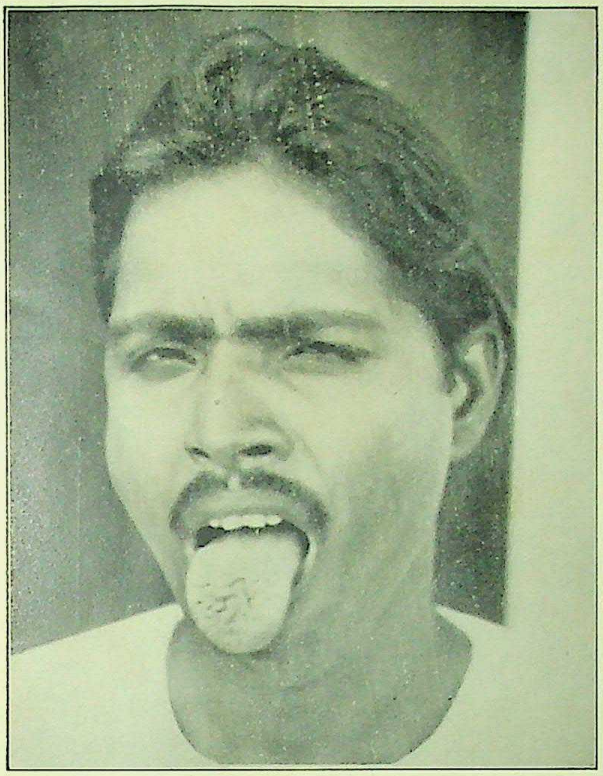

A typical case, with photophobia and fissuring of the tongue.

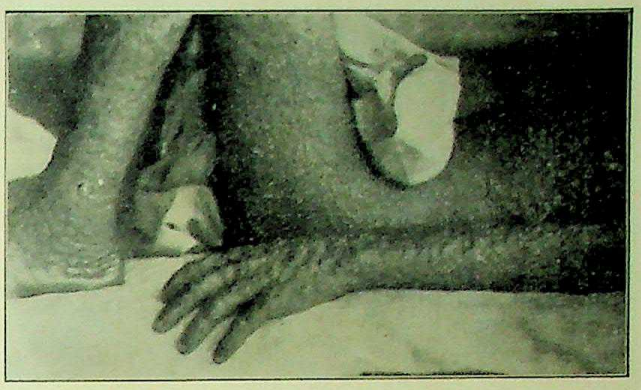

Fig. 1.—Confluent smallpox.

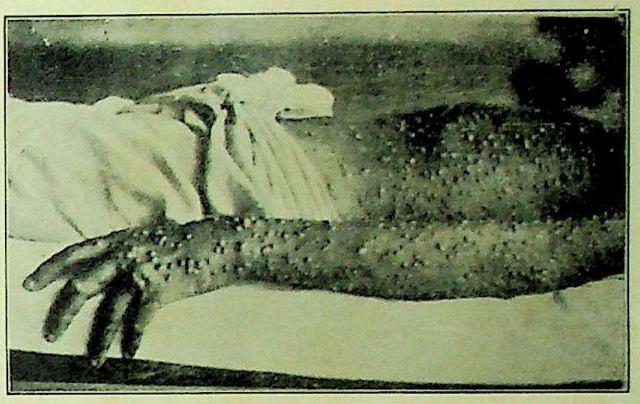

Fig. 2.—Discrete smallpox.

TINEA IMBRICATA IN INDIA : DEY & MAPLESTONE

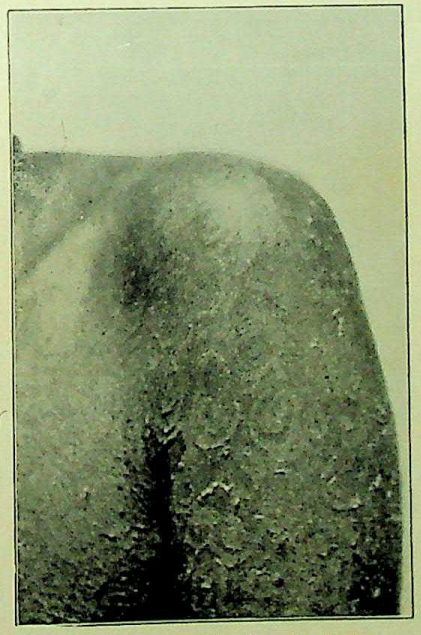

Fig. 1.—Photograph of a typical case showing concentric rings of scales.

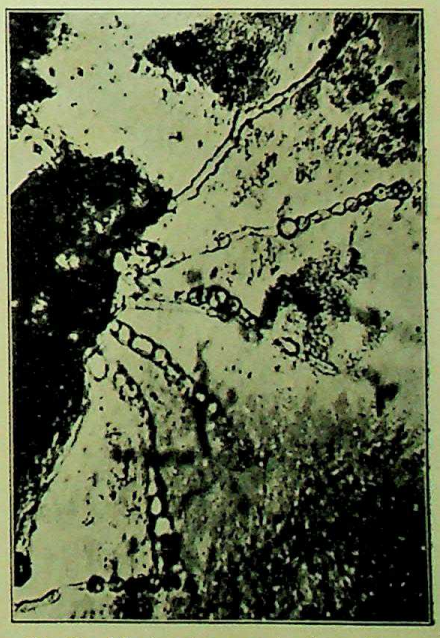

Fig. 2.—Photomicrograph of a primary culture from a scale on Sabouraud's medium.

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Fig. 1.—Anterior view.

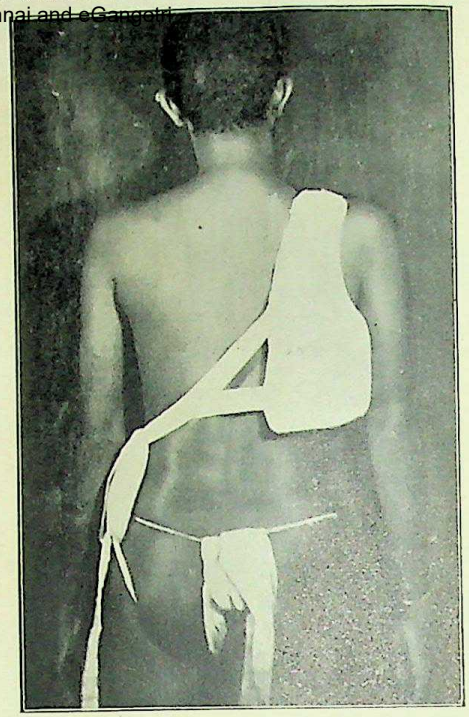

Fig. 2.—Posterior view.

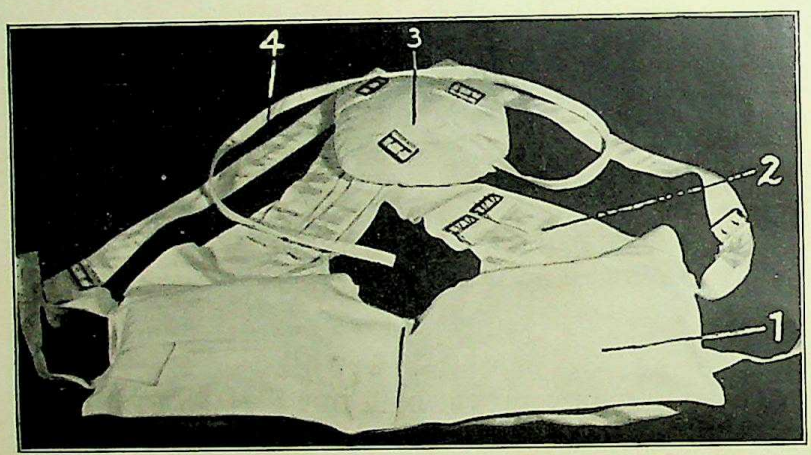

Fig. 3.—(1) The brace with pads inside. (2) Shoulder straps.
(3) Hip pad. (4) Groin strap.

SCURVY IN THE FAMINE AREAS OF HISSAR DISTRICT: M. MUSA KHAN.

Fig. 1.—Scurvy gums showing the 'beaded appearance' in between the teeth.

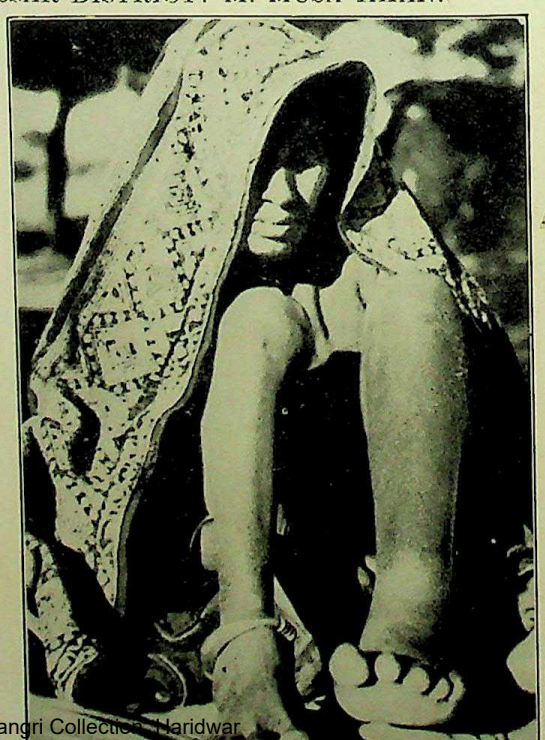

Fig. 2.—Hæmorrhagic effusion involving the whole of the left leg of a patient in marked

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TINEA IMBRICATA IN INDIA

By N. C. DEY, M.B., B.SC. (Cal.)

and

P. A. MAPLESTONE, D.S.O., D.SC., M.B., B.S., D.T.M.

(From the Medical Mycology Inquiry under the Indian Research Fund Association, School of Tropical Medicine, Calcutta)

THIS form of dermatomycosis has been recognized as a distinct type for many years, and is known to be widespread in the eastern hemisphere, throughout the area bounded by Ceylon in the west to China in the east, and Burma and Indo-China in the north to the South Pacific Islands. Apart from two cases mentioned by Castellani as coming from South India (a rather vague region) and one case carefully investigated by Acton and Ghosh (1934), which was proved to have originated in the Mymensingh district of Eastern Bengal, there are no other records in Indian medical literature of its existence in this country.

The disease is not so rare in India as these scanty records indicate, because one of us (N. C. D.), who had considerable experience in various parts of Assam some years ago, saw typical cases in many aboriginal tribes in the hill tracts of this province. At the same time he observed that it was rare in the immigrant inhabitants living on the plains and under slightly better conditions than the aborigines, and that when it was found in a plains-dweller there was invariably evidence that he had had frequent and close contact with the aborigines.

Recently the same author, while on leave in the Kamrup district of Assam, took the opportunity of collecting scales from five different persons from different villages, and this material has been subjected to laboratory investigation. In the primary cultures on Sabouraud's medium it was found that the cultures from two cases resembled *Endodermophyton tropicale* Castellani, and three of them, *E. indicum* Castellani. These differences are slight and on sub-culture on glucose agar under constant oxygen tension the two types became indistinguishable; as our cultural results are almost identical with those of Acton and Ghosh we are not giving them in detail in this paper. We failed to grow the fungus on 'natural' media such as wheat, barley and rice, and Acton and Ghosh failed to grow it on damp wood, leather, coir matting, mud, etc., on all of which the common dermatophytes grow readily. We also had some success in animal inoculation as we obtained a transient infection on the scarified skin of guinea-pigs where the above workers were unsuccessful.

Acton and Ghosh expressed the view that *E. tropicale* and *E. indicum* were probably identical but as they had only a single strain of fungus to study, they could not prove it definitely. Our results, based on the study of material from five different cases, have shown that Acton and Ghosh were correct in their suggestion.

Nomenclature of the causative organism.

Castellani and Chalmers (1913) listed three species of the genus *Endodermophyton*, namely, *E. concentricum* Blanchard, 1896, *E. indicum* Castellani, 1911 and *E. castellanii* Perry, 1907. In the third edition of their book the same workers (1919) added the two species *E. mansoni* Castellani, 1914 and *E. tropicale* Castellani, 1914. Thus at this time it was claimed that there were five species of fungus responsible for supposedly slightly varying types of tinea imbricata in the eastern hemisphere. Dodge (1935) placed *E. castellanii* and *E. mansoni* as synonyms of *E. concentricum* and Ota and Kawatsuré (1931), said they were unable to differentiate *E. concentricum* and *E. indicum* as the result of the study of a culture supplied by Castellani; finally we have proved that *E. indicum* and *E. tropicale* are identical, therefore, four of the above species fall as synonyms of *E. concentricum* which is accordingly the sole cause of tinea imbricata in Asia and the Eastern Archipelago.

The generic name *Endodermophyton* first appeared in Castellani and Chalmers (1910) as '*Endodermophyton* Castellani, 1909" but in the same publication there is '*Endodermophyton castellanii* Perry, 1907'. On this account there is some doubt as to whom the generic name *Endodermophyton* should be ascribed and Dodge (1935) gets over the difficulty by writing *Endodermophyton* Perry, 1907; Castellani and Chalmers, 1910. Castellani defines the genus as characterized by the fact that the fungus grows between the superficial and deep layers of the epidermis, and in discussing the cultural characters he says that Sabouraud

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AYKROYD, W. R., KRISHNAN, B. G., and PASSMORE, R. (1939). *Lancet, ii,* 825.

ELLIOT, R. H. (1920) .. *Tropical Ophthalmology.* Henry Frowde, Hodder and Stoughton, London.

HERBERT, H. (1901) .. *Ophthalmol. Rev., London,* **20,** 339.

HOU, H. C. (1940) .. *Chinese Med. J.,* **58,** 616.

KARUNAKARAN, C. O., and NAIR, P. K. (1940). *Indian J. Med. Res.,* **28,** 371.

KATZENELLENBOGEN, I. (1939). *Lancet, i,* 1260.

KIRKPATRICK, H. (1920). *Brit. J. Ophthalmol.,* **4,** 16.

KRUSE, H. D., SYDENSTRICKER, V. P., SEBRELL, W. H., and CLECKLEY, H. M. (1940). *Pub. Health Rep.,* **55,** 157.

MANSON-BAHR, P. H. (1941). *Trans. Roy. Soc. Trop. Med. and Hyg.,* **34,** 347.

NAIR, V. G. (1939) .. *J. Indian Med. Assoc.,* **8,** 215.

ODEN, J. W., ODEN, L. H., and SEBRELL, W. H. (1939). *U. S. Pub. Health Rep.,* **54,** 790.

SEBRELL, W. H., and BUTLER, R. E. (1938). *Ibid.,* **53,** 2282.

Idem (1939). *Ibid.,* **54,** 2121.

SYDENSTRICKER, V. P., SEBRELL, W. H., CLECKLEY, H. M., and KRUSE, H. D. (1940) *J. Amer. Med. Assoc.,* **114,** 2437.

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and Pinoy, to whom he referred his material, drew attention to the similarity of the growth of this fungus to that of the genus *Achorion*. Guiart and Grigorakis (1928) in their system of classification give *Endodermophyton* as a synonym of *Achorion*, but Dodge (1935) does not accept this system because he says that several of the rules of nomenclature have been ignored in drawing it up, so he retains *Endodermophyton* as a valid genus. Before publication of his book, Dodge probably did not see the paper by Acton and Ghosh (1934) who considered the differentiation between *Achorion* and *Endodermophyton* unjustified, and our results agree with theirs so it is probable that eventually the name of this species will be finally agreed upon as *Achorion concentricum* Blanchard, 1896 (Guiart and Grigorakis, 1928).

It should be added that there are two other species in this genus, namely, *Endodermophyton roquettei* Fonesca, 1925, and *E. africanum* Dodge, 1935, which are responsible for similar clinical conditions in South America and Africa, respectively.

Clinical characters of tinea imbricata

As it appears probable that this disease may be commoner in India than is realized and it is possible that, like yaws, it will be found in aborigines in other districts than Assam, if it is looked for by anyone competent to diagnose it, we give the following short description to help the uninitiated to recognize it if they happen to encounter it :—

The disease may begin anywhere on the skin surface as round or oval macules a few millimetres in diameter. The horny layer soon breaks in the centre forming a ring of scales attached by their outer borders; the infection goes on spreading and successive new rings of scales begin in the centre and spread in turn, so that eventually there is a circular lesion composed of concentric rings of scales. Large areas of the body surface are generally involved and the circular lesions run into each other so that a fully-developed case presents a system of parallel wavy lines which at first glance creates the impression that a complicated series of figures has been tattooed on the skin; the appearance of tattooing is enhanced on a dark skin because the lines of scales stand out whitish against the dark background. Irritation is usually severe but inflammation is not a prominent feature; the hairs are not affected.

Diagnosis is usually easy, but in old cases with large scales in which the typical ringed appearance has become indistinct the condition may be mistaken for ichthyosis; a search will usually reveal a newer lesion, however, in which the characteristically concentric rings of scales are still apparent.

Treatment is tedious as the infection yields slowly and it is usually so extensive that only

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SCURVY IN THE FAMINE AREAS OF HISSAR DISTRICT, PUNJAB

By MOHD. MUSA KHAN, M.B., B.S., D.T.M., D.P.H.
Nutrition Officer, Public Health Department, Punjab

THERE are many records in the past of the occurrence of scurvy when individuals or groups of individuals are so situated that they are unable to obtain fresh food.

The district of Hissar in the south-east of the Punjab has been visited by famine on many occasions during the past 250 years. There are records of famine occurring in this area in 1783, 1860-61, 1869-70, 1896-97 and 1899-1900.

It is surprising that in the records of these visitations there is no definite mention of scurvy as a cause of death, although death-rates were very high indeed and the population was reduced to dire straits. Some idea of the state of affairs may be gathered from extracts from district gazetteers. The following is taken from the gazetteer of 1915 (Fagan and Townsend, 1916) :—

'The first famine of which we have any authentic account is that of A.D. 1783, the "Chalisa Kal", or

(*Continued from previous column*)

a part can be treated at a time. Castellani recommends his fuchsine paint and a useful alternative application is one composed of one drachm each of resorcin and glacial acetic acid in one ounce of compound tincture of benzoin.

The epidemiology of tinea imbricata is interesting because it has remained relatively localized to certain races and areas, unlike the other dermatophytes which seem to have spread almost over the whole world in the last twenty years, and have involved all races and classes of people. The comparatively limited distribution of this disease is explained by the fact that the fungus does not appear to be capable of maintaining an independent saprophytic existence on leather, wood, mud, etc., as the other species are able to do so that infection can only be acquired by direct contact.

Summary

The identity of all the species of *Endodermophyton* causing tinea imbricata in the eastern hemisphere is confirmed and attention is drawn to the possibility that this disease is commoner in India than is now recognized.

REFERENCES

ACTON, H. W., and GHOSH, L. M. (1934). *Indian Med. Gaz.*, **69**, 426.
CASTELLANI, A., and CHALMERS, A. J. (1910). *Manual of Tropical Medicine.* Baillière, Tindall and Cox, London.
Idem (1913). *Ibid.*
Idem (1919). *Ibid.*
DODGE, C. W. (1935) .. *Medical Mycology.* C. V. Mosby and Co., St. Louis.
GUIART, J., and GRIGORAKIS, L. (1928). *Lyon mèd.*, **141**, 369.
OTA, M., and KAWATSURÉ, S. (1931). *Ann. Parasitol. Humaine et Comparee*, **9**, 144.

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famine of "San Chalisa" (Samat 1840) by which the whole country was depopulated. . . . The peasants abandoned their villages and died by thousands of disease and want . . . and none remained behind who had strength to fly. No reliable statistics of the mortality are extant, but there can be no doubt that the people suffered terribly. Some died helplessly in their villages, others fell exhausted on the way towards the south and east, where they thronged in search of food and employment. The price of the commonest food grains rose to 5 and 6 seers per rupee. Fodder for cattle failed utterly and the greater part of the agricultural stock of the district perished. But for the berries found in the wild brushwood the distress would have been even greater.'

Although scurvy is not mentioned, the following extract from the same source is significant and indirectly suggests that scurvy may have been present :—

'Many immigrants from Bikaner again came into the district and the poor who were unable to buy grain supported themselves on the fruit of the *karil*, which is unwholesome when eaten in any quantities, and on the leaves of the *jal* or *pilu*. But whether the jungle fruits were wholesome or not, they were the means of saving many lives: for in this year of famine the crop of wild fruit was larger than had been ever before remembered and during the month of June gave food to many thousand people.'

Quite apart from actual famine there have been in Hissar district in recent times many years of scarcity not amounting to famine, when crops failed partially and local food supplies were much reduced.

The present famine which has not yet ended began in 1938, famine being officially declared by Government in December of that year. Throughout the whole of the 1939 acute famine prevailed, and it was not until the occurrence of rain in the year 1940 that the famine was mitigated to a limited extent : relative famine continued, however, throughout 1940 and into the first half of 1941.

A survey carried out by me during the months of February and March 1939, in two typical famine-striken regions of the district, provided data on which an estimate could be formed of the character of the diets being consumed by the population, and the physical state of the people. The survey produced very interesting information. The outstanding characteristic of the diets consumed by the people was a complete absence of green vegetables. Milk and milk-products also were almost entirely absent from diets. Briefly stated the diets consisted mainly of cereals, with pulses in small amount and condiments. The only relieving feature about the diets was that they were quantitatively sufficient, *i.e.*, yielded just enough calories for the kind of work the people were required to do. Otherwise, the diets were extremely ill-balanced. They contained practically no proteins or fats of animal origin. They were positively deficient in calcium. Above all, their vitamin content was extremely low. Vitamin A was utterly inadequate and vitamins C and D were altogether absent.

As regards physical condition 82 per cent of workers on famine relief works and 50 per cent of non-workers were found to be nutritionally sub-normal. The state of nutrition of young children is a sensitive index of the nutritional state of the individuals of the community from which they are drawn. Eighty-four per cent of school children were found to be sub-normal physically. A majority of these children showed positive and well-defined signs of malnutrition, *i.e.*, dryness of the skin, phrynoderma, xerophthalmia, and even stunted growth.

It is interesting to note that in the population surveyed by me no case of clinical scurvy was found at this early stage of the famine.

In December 1939, a rather sudden deterioration in health conditions occurred in the district, accompanied by a material increase in death-rates. This led to careful investigations in a number of selected villages which resulted in the discovery of cases of scurvy. From December 1939 on to the end of March 1940, cases continued to occur, but with the application of appropriate preventive measures the disease disappeared during the months of April, May and June 1940, only to reappear when these measures were, in the first instance, curtailed and later discontinued altogether. It is interesting to know that scurvy appeared to have been stamped out by the issue of germinated grain (Nicol, 1940) to the famine-stricken population. It is still more interesting to know that on the discontinuation of germinated grain, the disease reappeared, and disappeared a second time when germinated grain was reintroduced as a prophylactic. The following table provided by Lieut.-Colonel C. M. Nicol, M.A., M.D., I.M.S., Director of Public Health, Punjab, shows the sequence of events.

Of the total of 351 cases of scurvy which came to light between December 1939 and December 1940, I personally saw and treated 42 cases. There are, however, accurate records of 150 additional cases which were admitted into dispensaries throughout the district for treatment. The records of these cases were kept by doctors in charge of dispensaries, but I saw a majority of these cases and was able to confirm the diagnosis.

Of these 192 cases, 156 came from the Hansi and Bhiwani tehsils of the district. This is interesting, because scarcity of food in recent years has been much more marked in these two areas than elsewhere in the district.

Seasonal occurrence.—The seasonal occurrence of the disease cannot be satisfactorily estimated because of the obvious effect of preventive measures. Perhaps a more important point is that the disease was not discovered until more than a year after the famine had commenced. It is most unlikely that the disease really developed as suddenly as it would appear to have done, judging from the available figures. Subclinical scurvy unquestionably existed for many months before the fully-developed disease was diagnosed. Of this there can be little doubt, because of the known absence of vitamine C

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from the diets on which the population were living. Enquiry, too, showed that the clinical picture of scurvy was quite well known in many villages in which death-rates had been greatly increased during the famine, causes of death being notified as 'dysentery', 'fever' and under other general headings. A factor of importance in explaining the fact that scurvy did not come to light sooner is the natural reticence of the people living in these areas. It was with the greatest difficulty that I was able to induce villagers to bring out their sick from their houses and, on more than one occasion, when one had succeeded in doing so, cases of scurvy were found.

During the whole of 1939, it should be remembered, doctors were not touring in villages and were not coming into contact with the sick in their own homes. The general re-organization of health work which allowed of dispensary doctors touring, greatly facilitated the discovery of cases and the bringing of them under treatment. Systematic search was, in fact, made in all villages for cases of scurvy.

Racial distribution is shown by the following table :—

TABLE

The effect of public health measures on mortality and the incidence of scurvy in Hissar famine areas

Main factors operative in relation to health		Total deaths	Increase (+) or decrease (—) compared with the corresponding month of the previous year	Number of cases of scurvy discovered and treated	
December 1939: Preventive and curative work reorganized and expanded, and brought under one control.	1939 December	2,455	— 278	67	
Amla juice introduced for treatment of scurvy.	1940 January	2,299	— 1,586	80	Period during which special measures were continuously applied.
First week of February: Germinated grain introduced as a prophylactic against deficiency disease. Bi-weekly issues (1 oz. dry grain) to approximately 200,000 individuals continued until the end of May.	February	1,918	— 1,275	60	
	March	2,177	— 859	9	
	April	2,643	— 453	*nil*	
	May	3,290	— 811	*nil*	
Reduction in issue of germinated grain.	June	3,177	— 849	*nil*	
Closure of relief works and works dispensaries, and gradual stoppage of issue of germinated grain.	July	2,591	— 931	2	Progressive discontinuation of special measures.
	August	2,868	— 188	2	
	September	3,564	+ 1,002	53	
No relief. No germinated grain ..	October	3,482	+ 1,000	48	
	November	3,288	+ 935	21	
Gratuitous relief and germinated grain reintroduced for 140,000 individuals.	December	2,668	+ 213	9	Reintroduction of special measures.
	1941 January	2,042	— 217	*nil*	
			TOTAL ..	351	

TABLE

Distribution of cases

Affected areas	TEHSILS OF HISSAR DISTRICT					Adjoining villages of Bikaner State	Total
	Hansi	Bhiwani	Hissar	Fatehabad	Sirsa		
Number of cases ..	117	39	23	10	1	2	192

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TABLE

Race	HINDUS						MUSLIMS			GRAND TOTAL.
	Jats	Brahmans	Mahajans	Bishnoi	Menials	Total	Rajputs	Others	Total	
Number of cases.	133	10	2	2	32	179	10	3	13	192

We are dealing with a relatively small group of cases so that one cannot be dogmatic. The general proportion of Hindus and Muslims in the district is 3 to 1 according to the 1931 census. The racial distribution, therefore, as indicated in the table, is not in accordance with the relative proportions of the inhabitants.

Sex distribution.—Out of 192 patients, 138 were males and 54 females. No great stress can be laid on this sex distribution. As mentioned above it is difficult to get villagers to produce their sick, particularly their women folk, as purdah is observed by a large proportion of the inhabitants, particularly Rajputs, both Hindu and Muslim.

Age incidence is shown in the following table :—.

TABLE

Age group	AGE IN YEARS							60 and upwards	Total
	Infants under 5	5 to 10	11 to 20	21 to 30	31 to 40	41 to 50	51 to 60		
Number of cases.	3	3	4	25	39	48	43	27	192

A glance at the table shows that all age groups were affected.

Social and economic status of the sufferers.—The patients came from all the social and economic strata of villages, from the comparatively well-off landowners and shopkeepers down to menials. The fact is that the famine had obliterated many social and economic distinctions and practically the whole population was reduced to a common nutritional level, at least qualitatively.

The clinical picture of scurvy.—I propose to describe scurvy as it appeared in the famine areas of Hissar and as it manifested itself in 32 cases with which I was more immediately concerned. It will be possible, however, to show that the clinical picture was fairly uniform throughout, and that the clinical findings of dispensary doctors corresponded very closely with mine.

Dietetic history

This confirmed the deductions made from the dietetic survey. Of the 32 patients at one centre, 8 stated that they had not taken green vegetables, cooked or fresh, for a period of 6 months. The remaining 24 had eaten cooked potatoes, onions, radish or other vegetables occasionally, but not oftener than once or twice in a fortnight or a month. Even in such cases the quantity of vegetable consumed per head was very small, a pice (¼ anna) worth of vegetable weighing about 5 oz. being shared by a whole family of half a dozen or more members. Seven of these 32 patients said that a certain amount of milk was available in their homes, the amounts per household varying from 2 to 16 lb. per day, and these amounts were shared by 6 to 8 individuals.

General appearance.—A majority of the patients looked thin and anæmic, but two out of the 32 looked well covered and well fed.

Onset.—The onset of the illness was gradual in the majority of cases. Nineteen patients (60 per cent) experienced early symptoms such as headache, backache, lassitude, disinclination to exertion, depression and even loss of appetite, 5 to 7 days before characteristic symptoms appeared. In a few cases this period of lethargy and loss of energy was of a longer duration and varied from a fortnight to a month. One of the patients stated that about a week before the actual illness, he felt a whirling sensation and giddiness in his head and a feeling as if he were going mad. He lost all interest in life and did not like to talk to other people or even smoke a *hukka* (hubble-bubble) with them. The onset of the disease in the case of the remaining 13 patients (*i.e.*, 40 per cent) was much more sudden: they did not experience the early general feelings of malaise.

Signs and symptoms.—The 32 cases varied in the duration of the disease and in its acuteness. The only two features of the illness constantly present in the 32 cases were—

(*i*) spongy bleeding gums with shaky teeth and foul breath, and

(*ii*) absence of pyrexia.

A majority of the cases had pain, swelling and tenderness of joints, and tender swellings in the

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muscles of the limbs. The lower extremities were involved much more frequently than the upper extremities or other parts of the body. Pain in muscles and joints was severe and of a stabbing character. In the more acute cases the patient was immobilized by the pain.

Gums and teeth.—In certain cases involvement of the tissue of the gums was so great that polypoid growths actually hung from the gums between the teeth. The slightest pressure caused bleeding from the gums. It is of interest to note that pyorrhœa is a very common condition amongst all classes of the population in Hissar district, but to what extent the specific effects of vitamin-C deficiency were superimposed upon a pre-existing pyorrhœa, it is not possible to say. Even if we assume that the mouth condition was so superimposed, the picture was very distinctive and conformed to the orthodox description of scurvy gums given in books, only it was much exaggerated. In fact, the disease could without difficulty be diagnosed by an examination of gums and teeth. These hypertrophic tissues were seen both externally and internally to the line of the teeth (plate II).

The gums and teeth were extremely painful and very tender to touch and difficulty was found in taking even fluid diet.

Hæmorrhages.—In scurvy, swellings in joints and in muscles are ordinarily ascribed to hæmorrhages into these structures. In a majority of the 32 cases very definite swelling of joints was present and, in addition, large swellings in the muscles, particularly of the lower limbs. It is presumed that these swellings were due to hæmorrhages because even in brown-complexioned individuals the skin over these swellings had the appearance of an ordinary extravasation of blood. The appearance was the bluish dark-red appearance of a severe bruise.

In some cases these effusions involved practically the whole of a limb, which appeared to be double the normal girth. The petechiæ ordinarily described in connection with scurvy were not found, perhaps owing to the fact that they could not be detected on dark skins. In two cases, there was a history of repeated epistaxis and two other patients gave a history of passing blood in the stools and of hæmoptysis.

Pains and swellings.—Swellings in limbs were extremely tender to touch. The skin over the swelling looked stretched and had a glossy appearance. The swelling was hot, tense and firm to touch and did not pit on pressure, and patients lay with joints flexed and in the severe cases were quite unable to move. On the slightest attempt to move them, they shrieked in agony. Although in most cases it was the larger joints that were swollen and painful, yet in a few cases the smaller carpal and metacarpal, and tarsal, meta-tarsal and phalangeal joints were involved also. The ankle joints were so frequently involved that villagers themselves called the disease by a word meaning 'swollen feet' (plate II). When the swellings subsided under treatment there was desquamation of the skin of the part.

Plimmer and Plimmer (1936) state that the bones in scurvy become brittle. There was one case of an elderly man who had suffered from scurvy over a period of months. He fractured his femur by falling from his bed—a height of about two feet—while attemping to move.

Sequence of the appearance of symptoms.—The order of appearance of signs and symptoms is interesting. In 66 per cent of the cases described, swelling in limbs and joints preceded any complaint regarding gums and teeth.

Notes on typical cases.—A detailed description of a few typical cases is given below:—

Case 1.—A Hindu Jat female, aged 60 years, wife of a village headman owning 150 acres of land. She was admitted on 9th February, 1940, in a bed-ridden and helpless state. Duration:—20 days.

History.—She had had no milk or vegetables for 6 months before her illness. About 10 days before the characteristic signs and symptoms of the disease appeared she felt lassitude, loss of energy and disinclination to work. Twenty days before being seen she felt 4 knotty swellings in her right thigh and 4 days later she got a big hard lump in her left thigh. Soon after that her left foot and ankle became much swollen and tender. She did not have any bleeding from the gums.

On examination.—The left foot, ankle, leg and thigh were swollen, tense and tender. The calf muscles of the left leg were stony hard, tender and hot to touch. The skin of the leg had a shiny appearance. There was a big hard lump 5 inches by 4 inches on the inner side of the left thigh and there were 4 smaller knotty swellings each about the size of a walnut close together on the outer side of the right thigh. The skin over these swellings was of a bluish hue. They were extremely painful on pressure. Both knee joints were tender on pressure, but they were only slightly swollen. The gums were spongy and tender to touch but not markedly so although she had pyorrhœa and shaky incisor teeth. She had no pyrexia.

Case 2.—A Hindu Jat, aged 70 years, a well-to-do landowner who did not accept the Government's gratuitous relief. Admitted on 26th February, 1940. Duration:—10 days.

History.—He had 16 lb. of cow's milk per day in his home in a family of 8 at the time of the occurrence of the disease. He also partook of cooked vegetables occasionally—once in a month or so. He did not experience any early symptoms at all. First of all he felt pain in both his knee joints, which became swollen, the right one first. Subsequently the sweling extended to both his calves, ankles and feet and he became bed-ridden. A week after the pain and swelling in the knees he developed swelling in the gums which became so painful that he could not take his food.

On examination.—Owing to severe pains the patient was actually weeping at the time of his admission. He had bad pyorrhœa and foul breath. The gums were markedly swollen and spongy and showed 'beaded appearance'. They bled on touch. Both the knee and ankle joints were swollen, hot and tender. He kept his knees flexed and immovable. The muscles of both his calves and thighs were tense and painful and marks like bruises were seen on the skin. There was no fever.

Case 3.—A Muslim Rajput, aged 56 years, a chronic case. Admitted on 17th January, 1940. Duration:—4 months.

History.—He had had no milk or vegetables for a year. A month before falling ill he lost energy and

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felt fatigued. He also lost his appetite. One day on getting up from his bed he noticed swelling of his left thigh. Soon both his thighs and legs became swollen and painful and he became bed-ridden. Then all the joints of his lower extremities became inflamed and tender. About 20 days later his gums became swollen and bled profusely. The swellings between the teeth became pedunculated and he used to snip them off with his fingers. Simultaneously with the swelling of the gums he got bleeding from his nose—which continued for 10 days. Three months after the onset of the disease both his shoulder joints were also involved followed by the elbow and wrist joints of the left arm. They became swollen and intensely painful. The elbow and wrist joints of the right arm were not affected at all.

On examination.—The muscles of the thighs and legs were tense, swollen and painful on pressure. The hip, knee, ankle and shoulder joints were likewise swollen and extremely tender. The knee joints were fixed in the flexed position. The elbow and wrist joints of the left arm were both swollen and tender and the patient was unable to flex the fingers of his left hand. The patient was lying in a helpless state and was not able even to sit up in his bed. The gums at that stage were slightly swollen and tender.

Diagnosis.—The clinical picture of the fully-developed disease made diagnosis a comparatively simple matter when the possibility of scurvy was kept in mind. As will be mentioned later, the astonishing rapidity with which cases reacted to anti-scorbutics left no doubt as to the nature of the condition. Nevertheless, many cases must have escaped notice during 1939, and, even when dispensary doctors were informed of the likelihood of scurvy being found, cases were mistaken for other conditions. More than once scurvy was diagnosed as beri-beri, although on general grounds it was most unlikely that this disease should occur in an area in which the people were eating nothing but whole grain of various kinds. The confusion arose from the helplessness of an individual and his inability to move, which was wrongly believed to be due to neuritis, and also owing to the swelling of ankle joints. In many cases the name of a symptom was given to the disease. There was a tendency to dismiss cases by calling them simply pyorrhœa or rheumatism. A term 'famine œdema' was coined* to cover others.

Treatment.—Treatment consisted of—

(*i*) the giving of anti-scorbutics in concentrated forms, and

(*ii*) the provision of a properly-balanced diet.

Anti-scorbutics.—When cases first began to appear, orange juice or tomato juice, or both combined, were given. At the end of December 1939, however, I was informed of the work done by Giri (1939) on the vitamin-C content of the Indian gooseberry or *amla*, and as this berry flourishes in the Punjab, it was an easy matter to get large quantities.

Fresh juice of the *amla* was used and later on, when the fruiting season of the *amla* was over, a powder prepared from the dry fruit was used instead of the fresh juice. The 32 patients dealt with here were all treated by fresh *amla* juice excepting one who was given *amla* powder. The juice of 12 *amlas* was given per head per day. Fresh *amlas* were washed with water and scraped into small shreds on an ordinary household grater. Patients, whose oral condition permitted, were given the scraped *amla*. Others were given the juice squeezed from the scrapings. The juice was extracted from the scrapings by adding a little water, grinding them with pestle and mortar and straining through a piece of muslin. The residue left after straining was added to the liquid cooked diet of the patients who were on juice. A little sugar in the form of gur was added to the scrapings and juice to disguise the bitter taste. 12 *amlas* weigh, on an average, about 100 gm. and contain approximately 500 mgm. of ascorbic acid.

The results of treatment by *amla* were very dramatic. Within 24 to 48 hours of the commencement of treatment, pains disappeared and the swelling of the gums began to subside from the second day onwards. A patient immobilized through pains and swellings in his joints could sit up in bed on the fourth or fifth day from the commencement of treatment, and able to stand up and walk round his bed after a week. The average patient had recovered after a fortnight's treatment. One young man, who wept on account of the pains in his limbs, a fortnight later literally jumped in the air to demonstrate his recovery.

In another group of 10 cases—all typical scurvy—found later on in the famine areas, pure ascorbic acid was used in the treatment. It was found that results comparable to those obtained with *amla* juice in the quantities above stated could not be obtained on a dosage of less than 150 mgm., 3 times per day, making a total of 450 mgm. daily. Pure ascorbic acid was given by hypodermic injection in one case only. This method of administration appeared to have no advantage over oral administration.

Only one out of the 32 cases dealt with in this series was treated by *amla* powder. The powder was given in 6 other cases in which records were maintained. I myself gave the powder in 2 cases. The powder was prepared in the following manner in the month of March 1940. Fresh *amlas* were scraped on a household grater and the scrapings dried in shade were reduced to powder state by grinding in a handmill. It was stored in the cold-room of the Punjab Vaccine Institute, Lahore, and was used in the month of November 1940. The ascorbic-acid content of the powder was estimated by Harris and Ray's method by Mr. B. L. Khuller, M.SC., A.I.C., Public Health Chemist, who found that it contained 17 mgm. ascorbic acid per gramme. Eight gm. of this powder was given 3 times a day. The results were comparable to those obtained with the fresh juice and with pure ascorbic acid.

(*Concluded on next page*)

*The term is surely a well-established one.—EDITOR, *I. M. G.*

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A NOTE ON 'S. V. CHEST BRACE'.

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MAJOR, I.M.S.

and

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IMMOBILIZATION of the chest wall by different mechanical aids has been attempted with varying successes during the past 40 years. The methods vary not only with the object for which restriction of movements of the chest is indicated, but also with the ingenuity of the attempts to achieve the immobilization.

Sewall and Swezey (1921) used adhesive strapping around the chest at the axillæ. The same method was later used by Golden (1923) and Lilienthal (1925). Sauerbruch and Schumacher (1911) used a harness after thoracoplasty. Gravesen (1925) described in his English text his 'bandage' harness. An encircling plaster cast was used after thoracoplasty by Levitt (1922). Roberts and Nelson (Alexander, 1937) have described the use of a post-thoracoplasty brace. Weighted bags have been used by many surgeons to compress the lung over the decostallized area.

Woodruff's (1932) brace which has been regularly used in Alexander's clinic is simple, efficient and useful. It does not, however, avoid restriction of movement of the normal side of the chest, as the pressure pad on the operated side is strapped to, and counter pressure obtained from, a ring round the opposite shoulder.

The following conditions should be satisfied if a chest brace is to be considered efficient:—

1. It must produce sufficient compression.
2. It must be light.
3. It must be cheap.
4. It must be simple in construction.
5. There should be no restriction of movement of the opposite side of the chest.

Bearing the above points in view, on the suggestion of the senior author, one of us (R. V.) made a simple chest brace which we have found quite satisfactory in practice.

A sample brace was made out of a cut *banyan* (underwear) and a torn pillow, parts of which were stitched up into compression pads. Finding that it worked satisfactorily we made a properly tailor-stitched brace, a description of which is given below.

The compression is obtained by a piece of canvas or thick drill sufficient to go round and to suit the contour of the anterior and posterior walls of the hemithorax. The side of the canvas which is in contact with the chest wall has two pockets, one in front and the other behind, into which can be introduced a series of pads whose number is determined by the amount of compression required. The canvas is slung over the shoulder of the same side by adjustable straps. Y-shaped straps are fixed to the medial side of the brace anteriorly and posteriorly. Counter-pressure is obtained by a contralateral hip-pad to which the distal ends of the Y-shaped straps are fastened. The hip-pad in its turn is fixed in position by a groin strap which goes round the thigh of the same side.

The advantages of this chest brace are the simplicity and cheapness of its construction, its adjustability and the absence of pressure on the contralateral hemothorax.

REFERENCES

ALEXANDER, J. (1937) .. *Collapse Therapy of Pulmonary Tuberculosis.* Charles C. Thomas, Baltimore.
GOLDEN, S. (1923) .. *Amer. Rev. Tuberc.*, **8**, 170.
GRAVESEN, J. (1925) .. *Surgical Treatment of Pulmonary and Pleural Tuberculosis.* William Wood Co., New York.
LEVITT, N. (1922) .. *Amer. Rev. Tuberc.*, **6**, 410.
LILIENTHAL, H. (1925) .. *Amer. J. Surg.*, **39**, 227.
SAUERBRUCH, F., and SCHUMACHER, E. D. (1911). *Technik der Thoraxchirurgie.* Julius Springer, Berlin.
SEWALL, H., and SWEZEY, S. (1921). *Amer. Rev. Tuberc.*, **5**, 547.
WOODRUFF, W. (1932) .. *J. Thoracic Surg.*, **2**, 99.

(Continued from previous page)

Summary

1. The nutritional background against which cases of scurvy occur in a famine area is described.

2. A general description is given of the clinical picture of scurvy as it occurred in the famine areas of Hissar district and illustrative cases are described in detail.

3. An account is given of the results of treatment of clinical scurvy by the juice of the Indian gooseberry or *amla*, by a dried powder prepared from the *amla*, and by pure ascorbic acid.

4. The efficacy of germinated grain as a prophylactic of scurvy is referred to.

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I am grateful to Lieut.-Colonel C. M. Nicol, I.M.S., Director of Public Health, Punjab, for help in the preparation of this paper and to Dr. R. C. Puri for his assistance in the managements and treatment of a selected number of cases of scurvy at the Siwani Rural Dispensary, Hissar District.

REFERENCES

FAGAN, P. J., and TOWNSEND, C. A. H. (1916). *Punjab Dist. Gazetteers*, 11A, *Hissar Dist.*, 1915, p. 180. Supdt., Govt. Printing, Punjab.
GIRI, K. V. (1939) .. *Indian J. Med. Res.*, **27**, 429.
NICOL, C. M. (1940) .. *Indian Med. Gaz.*, **75**, 662.
PLIMMER, R. H. A., and PLIMMER, V. G. (1936). *Food, Health, Vitamins.* Longmans, Green and Co., London.

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ACHLORHYDRIA AND ANÆMIA

AN ANALYSIS OF 79 CASES

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NORMAL gastric juice contains hydrochloric acid, pepsin, rennin and the intrinsic factor of Castle. The secreting function of the stomach may be investigated by means of a fractional test meal. As ordinarily performed, the examination gives information only as to the hydrochloric-acid formation; the presence of pepsin and rennin can be recognized by *in vitro* test, but for the detection of the intrinsic factor *in vivo* tests are necessary.

Davis (1931) by using the histamine test meal was able to demonstrate that the failure of the stomach function was probably progressive; his investigations (confirmed by many others) established the fact that, as a general rule, the ferment factors of the stomach fail after the hydrochloric acid; and whenever there is absence of free hydrochloric acid, one may presume some diminution in the ferments as well. Consequently, in clinical practice, it has become customary to study only the acid secretion of the stomach. In the study of anæmia, the determination of the acid-secreting capacity of the stomach has become an established procedure; the finding of complete absence of acid in the stomach contents has assumed a diagnostic importance in the differentiation of the anæmias and may be of some value in their treatment.

By *achlorhydria* is meant the absence of free hydrochloric acid in the gastric juice, as judged by the production of a yellow colour, when dimethyl-amino-azo-benzol (Töpfer's reagent) is added to a specimen of the secretion. The term *achylia gastrica* was introduced by Einhorn (1892) to indicate the absence of both acid and ferment. Since the actual measurements of the ferment pepsin are rarely made in clinical practice, the terms *achlorhydria* and *achylia gastrica* have become synonymous. In this paper, we have used the term *achlorhydria* to indicate the absence of 'free' acid (di-methyl); to those cases which do not show 'free' acid even after a maximum histamine stimulus, we have given the name *true achlorhydria;* to others which do not show 'free' acid with the usual fractional oatmeal gruel test, but do so after the histamine stimulus, we have applied the term *false achlorhydria.*

Material.—In view of the above criteria, in a series of 418 general medical cases, we have come across 84 patients with achlorhydria. The percentage in our series works out to 20.09; and this figure agrees with that of Dhayagude and Khadilkar (1939) for Bombay. Table I gives the classification of the cases according to the diagnosis :—

TABLE I

84 cases

Diagnosis	Number of cases
Anæmia	79
Chronic gastritis	2
Chronic appendicitis	1
'Dyspepsia'	2

It is seen at once that the bulk of the cases is formed by the anæmia group; in fact, it was the anæmic state of these patients that necessitated their admission to the hospital for investigation. A detailed analysis of these 79 cases of anæmia, with special reference to the state of their gastric secretion, forms the basis of this communication.

Procedure.—In each case a detailed clinical history was taken. The blood was scrutinized minutely, recording all the absolute indices, a van den Bergh reaction, and the red cell fragility test; Wassermann or Kahn tests were done as a routine and, wherever indicated, other bio-chemical studies. A sternal marrow biopsy was done as a routine in all the cases. The urine and the fæces were subjected to a detailed examination in every case, and the fæces very carefully searched for parasitic ova. For the gastric analysis, in the first instance, a fractional oatmeal gruel test was employed and, if this displayed no 'free' acid, the procedure was repeated by the method recommended by Castle and Minot (1936); this entails the use of dilute alcohol as the test meal and histamine as the special stimulus.

Results.—Tables II and III show the arrangement of the cases under the headings of true and false achlorhydria and their diagnoses in detail :—

TABLE II

True achlorhydria

44 cases

Diagnosis	Number of cases
Pernicious anæmia	13
Pernicious anæmia with subacute combined degeneration of the cord.	6
Tropical macrocytic anæmia	13
Idiopathic hypochromic anæmia (Witts')	5
Normocytic anæmia of varied origin ..	4
Ankylostomiasis	1
Pellagra	1
Carcinoma stomach	1

TABLE III

False achlorhydria

35 cases

Diagnosis	Number of cases
Tropical macrocytic anæmia ..	31
Idiopathic hypochromic anæmia (Witts')	1
Normocytic anæmia of varied origin ..	2
Normocytic anæmia: cirrhosis liver ..	1

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Discussion.—Seven, out of the 79 cases, secreted 'free' acid when the gastric analysis was repeated with the alcohol meal without the histamine stimulus; consequently, they have been grouped under false achlorhydria. It is worth noting that 28 of the 72 cases—38.8 per cent—showed the achlorhydria to be of the false type, and the results strikingly illustrate the importance of using the histamine stimulus for the demonstration of the true inability of the stomach to secrete 'free' acid.

Pernicious anæmia contributes the largest figure to the true achlorhydria group. Cahn and von Mehring (1886) were the first to demonstrate the absence of acid in the stomach contents in pernicious anæmia. The invariable occurrence of true achlorhydria in that disease was fully established by Hurst. However, we would like to emphasize the fact that some undoubted cases of genuine tropical macrocytic anæmia do exhibit a true achlorhydria; though, owing to the small number of cases studied, we refrain from drawing any percentage figures. This is quite contrary to the usual orthodox teaching after Wills; it means that the final differentiation of tropical macrocytic anæmia from pernicious anæmia cannot be made by the gastric analysis alone. The factors that help in difficult cases—and such cases are not very rare—are (*a*) unequivocal signs of involvement of the central nervous system, (*b*) a sternal marrow biopsy, and (*c*) response to liver extracts. We believe that an unequivocal demonstration of the affection of the central nervous system, a preponderance of the 'hæmoglobinized' megaloblasts in the marrow fluid, and a quick and ready response to the purer brands of liver extracts (of the anahæmin type, for instance), to be in favour of the diagnosis of a case of macrocytic anæmia as pernicious.

The occurrence of true achlorhydria in idiopathic hypochromic anæmia has been observed by many workers. Witts (1930), Davis (1931) and Hartfall (1934) have shown that true achlorhydria is found in over 80 per cent of the cases. In this condition at least one can say that the impaired gastric secretion with its consequent loss of appetite, indigestion, and improper absorption of iron determines the anæmic conditions.

The increased frequency of true achlorhydria in the upper decades of life has been commented on by many (Faber and Lang, 1908; Davies and James, 1930; Bloom and Poland, 1933). It will be seen from table IV that the largest number of true achlorhydrias falls in the ages between 41 and 50.

Whether achlorhydria, *per se*, leads to any gastro-intestinal symptoms has not been definitely settled. Faber and Lang (1908) mention epigastric distension, nausea, vomiting, gases, nervous symptoms of all sorts, diarrhœa, and mucus in the stools. A more definite syndrome, ascribed to achlorhydria, is often referred to as 'gastrogenous diarrhœa', first described by Oppler in 1895. Hurst (1923), Christian (1925), Eggleston (1931) and others believe that achlorhydria is a precursor of pernicious anæmia, combined sclerosis, chronic arthritis and carcinoma stomach. Table V shows the prevalence of the gastro-intestinal symptoms in our cases:—

TABLE IV

True achlorhydria

44 cases

Ages in years	Number of cases
11 to 20 ..	1
21 to 30 ..	11
31 to 40 ..	13
41 to 50 ..	15
51 to 60 ..	4

TABLE V

79 *cases*

Symptom	True achlorhydria	False achlorhydria
Total cases ..	44 cases	35 cases
Stomatitis or a previous history of it.	15	10
Loss of appetite	4	9
Vomiting ..	3	5
Diarrhœa or a previous history of it.	7	10

In assessing the significance of achlorhydria with anæmia, one has to be very particular in considering which of the conditions—lack of acid or anæmia—is the primary. Apperly (1936) states that when the red blood cell count is about half the normal figure, 'free' acid disappears from the stomach. Alvarez and Carlson (1936) found that when the hæmoglobin falls below 75 per cent free acidity is reduced, McRobert, Reddy and Subramanium (1940) record recoveries from histamine-fast achlorhydria with improvement in the associated anæmia. However, no definite conclusions can be drawn, for the present, regarding the production of any ill-effects by the achlorhydria, though most clinicians agree to the exhibition of hydrochloric acid in promoting recovery.

Summary

(1) An analysis of 79 cases of achlorhydria is given.

(2) It is stressed that the histamine stimulus must always be employed to distinguish true from false achlorhydria.

(3) It is pointed out that some cases of tropical macrocytic anæmia do exhibit true achlorhydria.

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LUNG SYPHILIS

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MOST of the textbooks of medicine and roentgenology begin the article on lung syphilis by the statement that a syphilitic lung affection in adults is a rarity (Boyd, 1935; Price, 1937; Sante 1936; Shanks, Kerley, and Twining, 1938, and Tice, 1929). Looking through the literature one finds a great variety of opinions on the question of how frequently an acquired pulmonary syphilis may be safely diagnosed. Whereas the well-known autopsy figures of Osler (1916), Symmers (1916) and Claytor (1905) seem to prove the extreme rarity of a syphilitic lung affection, some clinicians, such as Karschner and Karschner (1920), Munro (1922) and Watkins (1921), believe that this form of visceral lues is far more common than is usually assumed. An important step towards the solution of this clinical-pathological problem was the formulation of five conditions by Howard (1924) which, in every case of supposed lung syphilis, have to be fulfilled before the diagnosis is generally acceptable :—

1. Chronic lung affection with disproportion between grave physical signs and the much less affected general condition.
2. Constant absence of tubercle bacilli in the sputum.
3. History of syphilitic infection with positive Wassermann reaction.
4. Another syphilitic manifestation apart from the lung process.
5. Response to anti-syphilitic treatment.

The only way for the individual clinician or hospital to help in deciding the still open question, of how frequently acquired lung syphilis occurs among chronic lung affections, is the publication of every case where the diagnosis of pulmonary syphilis seems almost certain, according to the standardized criteria.

One more reason for reporting the following case is the fact that in the literature available to us no case of lung syphilis has previously been reported from India.

Case history

A Hindu ryot belonging to the Sudra caste, age about 40 years, was admitted into our hospital, seeking relief for two apparently quite different complaints. Four years ago there began a cough, mostly dry, occasionally producing some scanty expectoration, disturbing his night's rest and accompanied by an increasing dyspnoea during most of the past year. One month prior to admission a severe pain began in his shoulders and arms, soon becoming excruciating in intensity during the night; a quickly increasing weakness of the arms, which not only made agricultural labour impossible but even prevented him from feeding himself without the help of others (as he could not lift the hands to the mouth), compelled him to seek admission. There was no fever at any time of his illness and none for years previous to it. About ten years prior to admission, six years before the cough began, the patient contracted a venereal disease, described by him as a sore on the penis and painless swelling of the inguinal glands.

Examination on admission (5th November, 1940) revealed the following principal facts: a dark man of moderate build, apparently somewhat reduced in weight but not cachectic, able to move about, supporting his arms to alleviate the pain.

Cerebral nerves.—No abnormality, pupils reacting to light and accommodation.

Fundus.—No pathological signs.

Chest.—Left side of anterior chest-wall substantially, left posterior chest-wall, to a lesser degree, flattened; respiratory movement considerably diminished on the left side, more on the front than on the back. Movement on right side free.

Lungs.—Left side: The supra- and infra-clavicular regions down to the fourth intercostal space showed a hard, wooden dulness on percussion; supra- and infra-spinous fossæ dull to percussion, but to a much lesser degree; respiratory murmur very loud and bronchial in the dull region; adventitious sounds completely absent, even after coughing; vocal resonance and vocal fremitus considerably increased. No stridorous breathing.

(*Continued from previous page*)

I thank all my colleagues at the hospital for their co-operation; to Dr. J. C. Patel, especially I am grateful for constant help and many suggestions. I also thank Dr. R. Row, M.D., D.SC. (Lond.), the Director of our hospital, for the permission to publish this paper, and much guidance in its preparation.

REFERENCES

ALVAREZ, W. C., and CARLSON, L. A. (1936). *Proc. Mayo Clin.*, **11**, 391.
APPERLY, F. L. (1936). *Lancet, i*, 7.
BLOOM, A. L., and POLLAND, W. S. (1933). *Gastric Anacidity*. Macmillan and Co., Ltd., New York.
CAHN and VON MEHRING (1886). *Deut. Arch. Klin. Med.*, **39**, 233.
CASTLE, W. B., and MINOT, G. R. (1936). *Pathological Physiology and Clinical Description of the Anæmias*. Oxford University Press, London.
CHRISTIAN (1925) .. *Northwest Med.*, **24**, 531.
DAVIS, D. T. (1931) .. *Quart. J. Med.*, **24**, 447.
DAVIES, D. T., and JAMES, T. G. I. (1930). *Ibid.*, **24**, 1.
DHAYAGUDE, R. G., and KHADILKAR, V. N. (1939). *Indian J. Med. Res.*, **26**, 705.
EGGLESTON, E. L. (1931). *J. Amer. Med. Assoc.*, **97**, 1216.
EINHORN (1892) .. *Med. Rec.*, **41**, 650.
FABER and LANG (1908). *Zeitschr. Klin. Med.*, **66**, 53.
HARTFALL, S. J. (1934). *Brit. Med. J.*, **1**, 136.
HURST, A. F. (1923) .. *Lancet, i*, 111.
MCROBERT, G. R., REDDY, D. G., and SUBRAMANIUM, R. (1940). *Indian Med. Gaz.*, **75**, 324.
OPPLER (1895) .. *Deut. Med. Woch.*, **21**, 73.
WITTS, L. J. (1930) .. *Guy's Hosp. Rep.*, **80**, 253.

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Heart.—Not enlarged on percussion, normal configuration; apex beat slightly outwardly displaced, just in the mid-clavicular line, in the fifth intercostal space; over all ostia two clear sounds, no accentuation, no murmur; vessel-band apparently not enlarged; no abnormal pulsation. Pulse rate 92. Blood pressure 130/75.

Electrocardiogram: Low voltage. In lead IV R almost absent, T flat; moderate heart muscle-lesion.

Liver and spleen not enlarged.

Both the deltoid muscles and the muscles of the arms innervated by the fifth and sixth cervical wasted and showed diminished motor strength and loss of tone; sensory disturbances confined to the same area of the fifth and sixth cervical as shown by complete loss of sensation to touch, pain, hot and cold stimuli bilaterally over the lateral aspect of shoulder and upper arm, the radial side of the forearms, thumbs and index fingers. Biceps-, supinator- and pronator-jerks lost; triceps-jerks brisk. Triceps and the small muscles of the hands did not show any change; abdominal- and cremaster-reflexes normal as well as knee- and ankle-jerks; the lower extremities free from pathological signs.

Temperature was normal throughout his stay at the hospital and never exceeded 98.5°F. except after the first Bisoxyl injection.

Sputum.—Tubercle bacilli not found (concentration method): neither spirochætes, spirilla, mycelial threads, nor spores of fungi present; elastic fibres absent. The sputum examination was repeated seven times on 5th, 9th, 16th November, 5th, 23rd, 31st December, 1st January, always with the same negative result. The sputum was so scanty that we had to stimulate expectoration to get enough for examination; it was never rusty, hæmorrhagic or foul smelling.

5th November, 1941.—Leucocytes—5,900. Differential picture: polymorphonuclears—76 per cent, lymphocytes—23 per cent, eosinophils—1 per cent.

28th November, 1940.—Leucocytes—6,200.

8th December, 1940.—Leucocytes—6,400.

Tuberculin-reaction.—1/10,000 mg. i.d. negative, 1/1,000 mg. slightly positive.

Blood.—Wassermann reaction +++, Kahn ++, Kline ++.

Spinal fluid.—Clear, colourless, Nonne-Apelt negative, cells 3/c.mm., Wassermann reaction negative.

Our first tentative diagnosis was malignant tumour of the left upper lung lobe with secondaries in the spinal column affecting the roots of fifth and sixth cervical, though the duration of the complaints seemed too long for a malignant growth. But the radiological examinations changed our opinion.

The frontal and lateral radiograms of the cervical spinal column were normal.

The first radiogram of the chest (plate III, figure 1, 6th November, 1940) showed a dense heterogeneous opacity which occupies the whole upper lobe including the apical region, the outlines not sharp, 'mossy' (Watkins, 1921); a dense peribronchial-perivascular structure radiates from the left hilum in the opaque region branching to an irregular network in the infra-clavicular part. Neither finger-like structures nor a sharp or a polycyclic outline is visible anywhere. The right side shows the lung tissue entirely free from any pathological signs; the lower part of the right hilum is slightly increased. Trachea, mediastinum and heart are pulled to the left side. On screening, the mediastinum shows no pathological movements. The diaphragm moves freely on both sides.

Radiological summary.—Diffuse infiltration of the whole left upper lobe with peribronchitis and displacement of trachea, mediastinum and heart to the left. Peribronchitis in the right hilum, radiating in the right lower lobe.

The diagnostic considerations excluded first fibro-caseous tuberculosis, from the fact that the right lung was entirely free in spite of four years' duration of the clinical process, that adventitious sounds were entirely absent, temperature normal and tubercle-bacilli in the sputum absent. There was no reason to suspect a mycotic infection, as neither the clinical picture nor the appearance of the sputum nor its microscopical examination showed any symptoms of mycosis. The diagnosis of a tumour was improbable, in spite of our first suspicion, as none of the protean tumour symptoms were present in the radiogram. Neither the physical signs (showing loud bronchial breathing with increased vocal fremitus and resonance) nor the *x*-ray appearance were those of a massive collapse. We had to be content with the diagnosis of an interstitial proliferative process with a subsequent fibrosis and peribronchitis. As tuberculosis, which is the usual reason of this condition, was most improbable in our case and a unilateral pneumoconiosis does not exist, there remained two possibilities: an unresolved pneumonia leading to carnification and fibrotic shrinking (improbable from the patient's history and the clinical signs) or a syphilitic interstitial infiltration (Assmann, 1922).

Treatment.—As the patient had contracted a syphilitic infection ten years ago and the serological reactions were strongly positive for syphilis, we decided to start with anti-syphilitic treatment, giving him no other remedies than Bisoxyl twice a week, Mapharside 0.04 to 0.06 once a week and occasionally a dose of an expectorant to get sputum enough for examination. We expected a good effect from this treatment on the radiculitis and hoped for some influence on the lung condition. Our expectations were satisfied regarding the first, but far surpassed on the second point.

The first Bisoxyl injection (9th November, 1941) caused a rise of temperature to 100°F. without any focal reactions; but the first and second Mapharside doses were followed by unbearable pains in shoulders, arms and left side of the chest with increased dyspnœa. The man tearfully implored the duty-doctor to alleviate his suffering; as barbiturates and pyramidon combinations in large doses failed, morphine-atropine injections had to be given to control these reactions.

The further development proved very soon that these exacerbations of pain were due to specific focal reactions. All pains subsided completely after 12 days of anti-syphilitic treatment; the objective signs of radiculitis, such as wasting and hypotony of the affected muscles, sensory disturbances and weakness of the arms disappeared gradually within five weeks of bismuth and Mapharside medication and even the biceps-jerks reappeared in the sixth week, so that the diagnosis—'syphilitic cervical radiculitis'—became almost certain.

Examining the lung twice daily we got the impression that the intensity of the dullness and the loudness of the bronchial breathing were slightly diminished two days after the second Mapharside reaction, 14 days after the anti-syphilitic treatment was started; this clinical improvement was soon, beyond any doubt, confirmed by the radiogram taken after four weeks of specific medication (plate III, figure 2, 6th December, 1940); the lower half of the left upper lobe became almost clear, the opacity of the left apical region diminished; the peribronchial infiltration, fan-like, converging to the left hilum, was still very marked; the right hilum appeared heavier. The deviation of the trachea, the displacement of the mediastinum and the heart were somewhat reduced.

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We have to stress the point that this process of quick improvement was not accompanied by increased cough or expectoration; the lung consolidation did not vanish by expectoration but by resorption only. Twenty-three days after the beginning of the treatment cough and expectoration subsided entirely; the improvement went on much more quickly than in the beginning; the flattening of the chest-wall appeared less definite, the respiratory excursions increased, the dullness melted away and the bronchial breathing was replaced gradually by harsh vesicular breath sounds. The radiograms taken twelve days and twenty-seven days later, respectively (plate III, figure 3, 19th December, plate III, figure 4, 2nd January, 1941), show the clearing of the interstitial infiltration and the considerably reduced peribronchial and perivascular thickening. The patient felt so well that we were unable to keep him longer in spite of the fact that the W. R. was still +++ positive; Kahn and Kline ++. Eight weeks after admission he resumed the hard work of the South Indian peasant.

We advised his nearest dispensary to continue the anti-syphilitic treatment and to send the patient for control every month. As he did not appear for four months, one of us (Krishnaswami) went up-country to seek him. After several attempts he found our patient and brought him, his wife and his daughter to the hospital. The wife's blood W. R. +++, Kahn and Kline ++ positive. Her child, a girl of ten, resembled in her mental development a child of five; she showed a saddle-nose and Hutchinson's teeth; her blood gave a W. R. +++, Kahn and Kline ++ positive. These signs of congenital syphilis enabled us to confirm the statement made by our patient regarding the time of his infection.

The man had received only 6 bismuth injections during the four months since he had left the hospital. About one month ago a slight weakness and numbness in the right arm began to trouble him again; he did not feel any dyspnœa, there was no fever, no cough, no expectoration and hardly any discomfort in the chest. The clinical examination showed no definite pathological signs in the lungs; however we got the impression that the right infraclavicular region was slightly duller to percussion, the breath sounds there somewhat harsher than on the left, the previously extensively damaged side. Temperature, pulse and respiration were normal. In the right arm an upper plexus type (Erb-Duchenne) of brachial plexus neuritis was present, though the symptoms were much milder than on the first admission and confined to the right side.

Radiogram of the chest (plate III, figure 5, 6th May, 1941) showed that the healing process in the left lung had progressed still further, so that this side looked almost normal; whereas the lower part of the right hilum showed very definite peribronchial thickening and looked much heavier than before; the most interesting change was a broad band in the basal part of the right upper lobe; it was of a high density and rather sharp in outline like a fibrous streak.

Laboratory findings

Urine and stool.—Nothing abnormal.

Sputum (after using expectorants).—Very scanty. Neither tubercle bacilli nor elastic fibres nor spirochætes present.

Blood examination.—Leucocytes—9,800. Differential picture: polymorphonuclears—80 per cent, lymphocytes —14 per cent, eosinophils—6 per cent. Hæmoglobin (Sahli)—62 per cent.

Sedimentation rate.—10 mm.

Wassermann reaction +++, Kahn and Kline reaction ++ positive.

Under intensive anti-syphilitic treatment the symptoms of upper brachial plexus neuritis showed a definite exacerbation lasting for twelve days; the following two weeks of continued bismuth and Mapharside injections brought about a perfect cure of all neurological signs.

The improvement of the lung condition is seen in the radiogram which was taken one month after the second admission (after 9 bismuth and 4 Mapharside injections) (plate III, figure 6, 6th June)*; the broad band-shaped opacity had disappeared; two thin strips of peribronchial thickening marked its former localization. The thickening of the right hilum was equally reduced. At this time the W. R. was only + positive, Kahn and Kline ±.

A few days later the anti-syphilitic treatment had to be stopped because the patient developed a very extensive ulcerative bismuth-stomatitis and glossitis; it took ten days of a combined treatment with vitamin C, nicotinic acid and liver-extract injections to cure this distressing condition.

One week later the patient felt so strong and well that we could not persuade him to stay longer; though he got only 2 bismuth and 1 Mapharside injection since the last radiogram (plate III, figure 6) was taken, the improvement continued, as seen in the next radiogram (plate III, figure 7, 1st July); it shows that a sharp strip not broader than a knife-edge in the base of the right upper lobe is all that remained from the fresh infiltration on the right side. The serological reactions, five weeks after the second admission, were W. R. negative, Kahn and Kline R. negative. A fortnight later after one more Mapharside injection, the last trace of the right side infiltration had disappeared (plate III, figure 8, 15th July).

The patient was re-admitted on the 20th November, 1941. The clinical examination did not reveal any pathological signs in lungs and nervous system. The radiogram of the lungs

* We tried several times to do a bronchography with lipiodol, but we failed because of the patient's lack of co-operation.

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showed the same slight fibrosis in left upper lobe and slight displacement of the mediastinum to the left side as seen in the radiogram (plate III, figure 8); the whole of the right side was free from any pathological sign.

Wassermann reaction, Kahn and Kline tests were negative.

The patient feels perfectly well and has gained 8 lbs. in weight.

Discussion

The clinical, radiological and serological observations prove that our diagnosis of a syphilitic lung lesion and the radiculitis were right. The diagnosis of acquired tertiary lung syphilis is further confirmed by the full accord between the reported facts and *Howard's* (1924) five points:—

1. A pulmonary affection, lasting for at least four years, showing a disproportion between the extensive objective signs and the comparatively mild subjective symptoms.
2. Absence of tubercle bacilli in the sputum in eight consecutive examinations.
3. History of syphilitic infection ten years previously and highly positive Wassermann, Kahn and Kline reaction.
4. Cervical radiculitis as a syphilitic manifestation apart from the lung process.
5. The quick and complete response of the pathological processes in the nervous and respiratory system to anti-syphilitic treatment.

That the lung signs in our case were not due to a syphilitic lesion of a bronchus with narrowing of its lumen is beyond doubt, from the clinical and radiological findings.

The pathological process in the left upper lobe was an infiltration, most probably peribronchial and perivascular; whether a true syphilitic 'gelatinous' (Stanley, 1911) pneumonia had developed is difficult to decide; the fact that the displacement of the mediastinum with trachea and heart to the affected side was reversible to some extent, proves that it was not due to a fibrosis only but to an extensive atelectasis of lung tissue by compression either from the interstitial infiltration or from a syphilitic 'broncho-pneumonia', which produces intra-alveolar specific cell-proliferation and fibrino-cellular exudate of patchy distribution with partial collapse of the unaffected areas. The residual displacement of the mediastinum is due to a fibrosis which is the cicatrization state of previous infiltration.

The *radiological* appearance of the fresh process in the right upper lobe before and after treatment makes the pathological diagnosis 'interstitial (peribronchial, perivascular) infiltration' almost certain.

The *radiological* classification of our case according to the system which Assmann (1922) put forward tentatively and which was generally accepted since is not difficult. Assmann (*loc. cit.*) states: 'most frequently one observes *interstitial processes*, progressing in the peribronchial and inter-lobular connective tissue, along the lymph vessels and sinuses; they penetrate the lung, radiating from the hilum and tend to shrinking cicatrization'. One cannot give a description better fitting our series of radiograms; the first stage is seen in the right upper lobe (plate III, figures 5 to 8), the full development in the left upper lobe (plate III, figures 1 to 4).

It is certainly wrong to postulate the right side or the middle zone and the lower parts of the lung as the characteristic localization of the lung syphilis as is done by some radiologists. In *Allison's* (1929) case the luetic process affects the left upper lobe, in Hartung and J. Freedman's (1932) first case it is scattered through both the lungs; the second shows a solitary gumma in the left lower lobe similar to the case described by Denman (1932). E. Freedman and Higley (1934) report a gumma of the right lower with atelectasis of the middle lobe. In Robinson's (1935) case the left upper and lower lobes have been involved. The radiogram reproduced by Twining shows a diffuse infiltration of the middle and basal third of the left lung and a dense opacity with sharp outlines in the right middle zone. Wigby and Sander's (1935) case, though clinically incomplete, was verified by necropsy; with microscopic examinations it was a gumma in the right upper lobe. In Pearson and de Navasquez's (1938) observation autopsy revealed a gummatous-fibrotic process in the middle third of the right lung, comprising the lower part of the upper and the upper parts of the middle and lower lobes: the same case showed further a syphilitic pneumonia in the middle third of the left lung, which occupied the lower part of the upper and the upper part of the lower lobes. None of these cases show an involvement of the whole apical region as seen in our radiograms.

Conclusion

Howard's five points are very useful in making certain the diagnosis of acquired lung syphilis, if a histological confirmation is not available. The first stage of tertiary syphilitic lung lesion in the described case is an interstitial peribronchial infiltration. Interstitial infiltration, shrinking fibrosis and probably specific pneumonic exudation might be found at the same time, as different stages of the same pathological process. Displacement of mediastinum, trachea and heart is shown to be reversible in as much as it is not due to fibrosis but to partial atelectasis.

Acquired lung syphilis may be localized in any part of the lung; neither one side nor one lobe seems to be more frequently affected than another.

Summary

A case is reported of tertiary syphilitic lung infiltration involving the whole *left* upper lobe which was clinically almost cured after seven weeks of anti-syphilitic treatment. Four months

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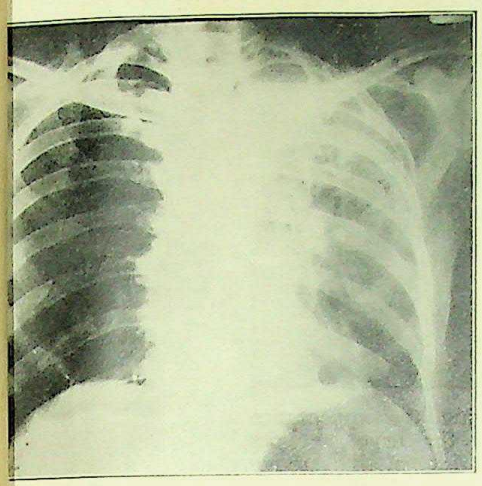


. 1.—6th November, 1940. Opacity of ole left upper lobe. Mediastinum displaced to the left.

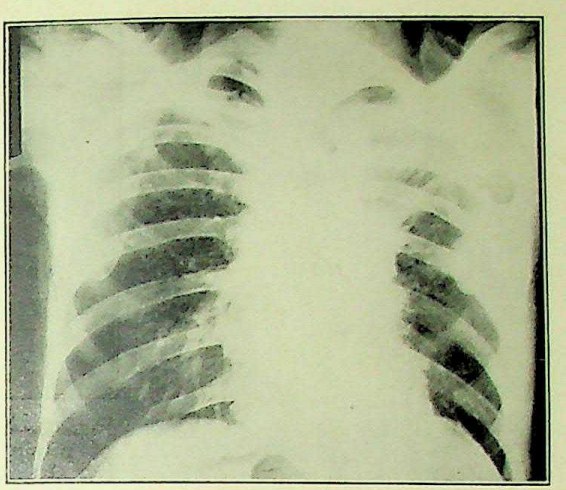


Fig. 2.—6th December, 1940. Clearing of basal part, left upper lobe.

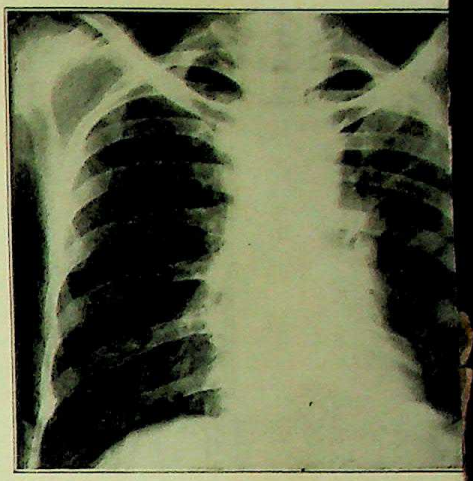
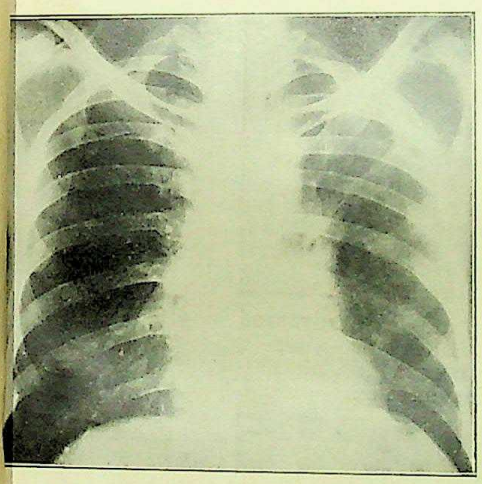


Fig. 3.—19th December, 1940. Further cle



. 4.—2nd January, 1941. Left upper lobe ıost clear. Mediastinum displacement reduced.

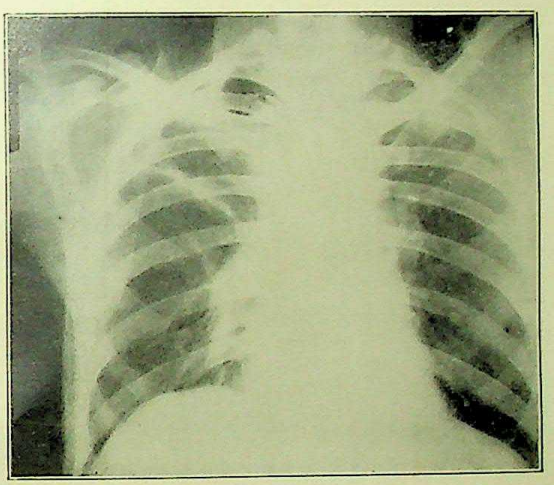


Fig. 5.—6th May, 1941. Peribronchial infiltration in basal part of right upper lobe and in the right hilum.

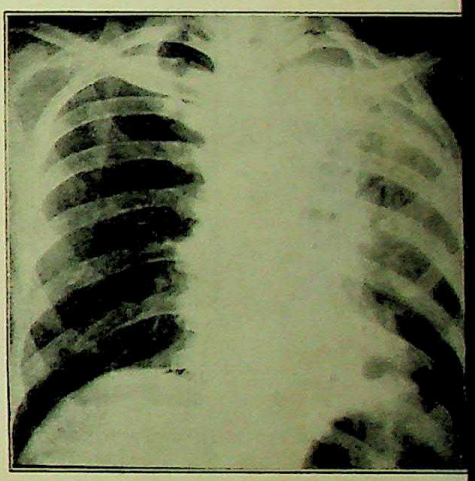


Fig. 6.—6th June, 1941. Infiltration re to two thin strips.

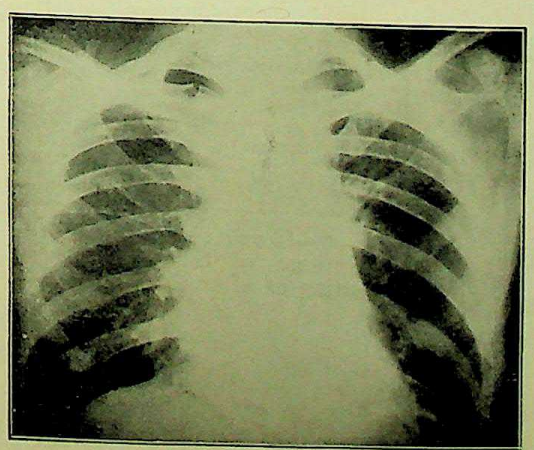


Fig. 7.—1st July, 1941. One sharp thin strip is left.

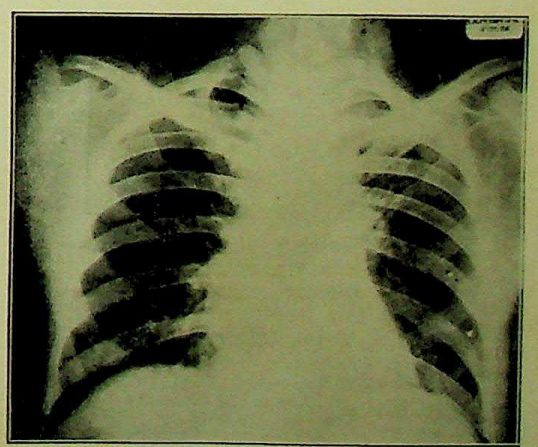


Fig. 8.—15th July, 1941. Infiltration in right upper lobe has disappeared.

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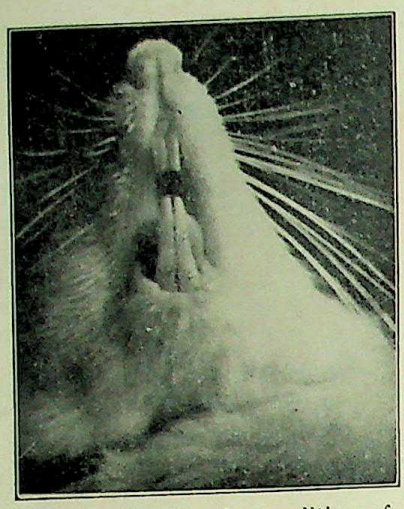

Fig. 1.—Showing the condition of the incisors of the rat before treatment with the water from Nagercoil.

Fig. 2.—Showing the appearance of pitting on the lower incisors by the 18th day of the above treatment.

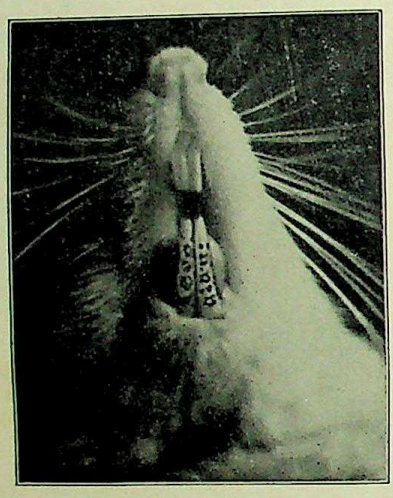

Fig. 3.—Showing the rapid development of the pitting (mottling) of the lower incisors as on the 28th day of treatment.

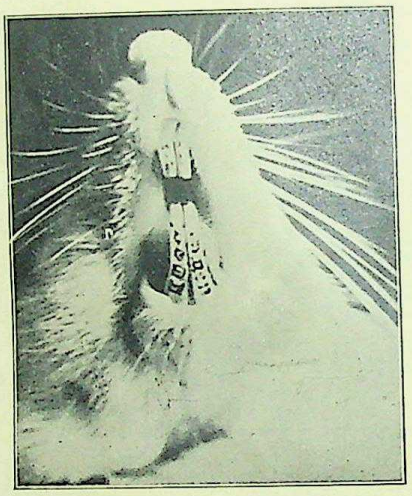

Fig. 4.—Showing the advanced stage of mottling as after a month; the upper incisors are also being affected.

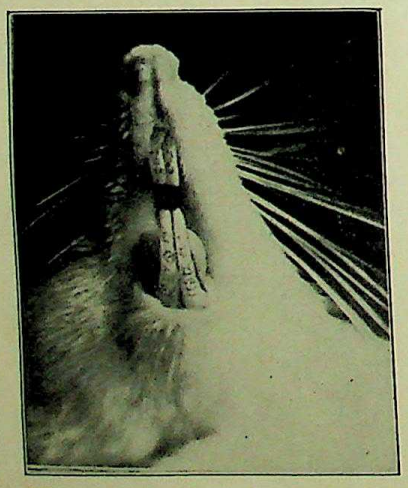

Fig. 5.—Showing the stage of recovery from the external symptom of pitting consequent on stopping the treatment with the Nagercoil water (after a month).

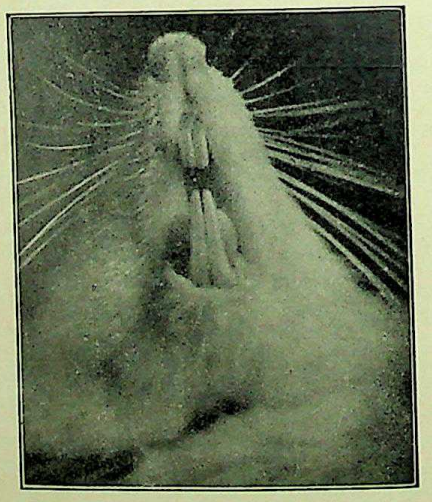

Fig. 6.—Showing the rapid disappearance of the symptom of pitting as after three months.

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FURTHER OBSERVATIONS ON THE MOTTLED ENAMEL IN NAGERCOIL

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IN a previous communication (Pillai, 1938), it was reported that a section of people who use the water from a public well in a certain locality in Nagercoil (S. India) suffered from mottled enamel. Later, it was of interest to make the further observation that only those who had used this water continuously from their childhood were affected. Thus, such of those residents of the locality who happened to settle down there after having spent their early years (up to about ten years) elsewhere were not visibly affected by the use of the local well water. It would appear that mottling takes place during the formative period of the teeth, at any rate under the conditions obtaining at Nagercoil. With a view to studying the nature and extent of mottling under these conditions, experiments were carried out with rats. The water was further analysed for other mineral constituents, and the results are given in the table.

TABLE

The mineral composition of the Nagercoil well water

(results expressed in parts per 100,000)

Silica (SiO_2)	10.04
Iron and aluminium oxides (Fe_2O_3 & Al_2O_3)	Traces
Calcium (Ca)	6.00
Magnesium (Mg)	2.01

Animal experiments with the Nagercoil well water.—Albino rats (about 5 weeks old) were used for the experiments. As far as possible animals of the same litter were used; two or more rats from each litter were used for the experiments, while a corresponding number of about the same weight were kept as the control set. The experiments being designed primarily to elucidate the effect of fluoride-containing water on the production of mottled condition, the diets were otherwise made adequate. In both the sets of experiments, the animals were placed on a diet including mixed cereals, legume, yeast, casein, minerals and, more important, fat-soluble vitamins (in the form of cod-liver oil). The only difference between the experimental and the control diets was that, whereas the former was made up with fluoride-containing water from Nagercoil (the animals also were given the same water to drink), the controls were given fluoride-free water. The growth rates of the animals as well as the conditions of the teeth from time to time were studied.

Observations.—It was observed that, during a period of 13 weeks, there was practically no significant difference between the growth rates of the experimental and control animals. On the other hand, there was a striking difference in regard to the conditions of the teeth. These observations are illustrated in plate IV, figures 1 to 6; also figure 7. It may be observed that in about a month the mottled conditions reached an advanced stage and was clearly visible on the lower and upper incisors. This condition continued during the subsequent period so long as the animals were given the same water.

Effect of change of water on the mottled condition.—After the dental defect had reached the advanced stage, some of the experimental

(*Continued from previous page*)

later a control examination revealed a peri-bronchial infiltration in the *right* upper lobe which disappeared after four weeks of intensive anti-syphilitic treatment.

The lung process was accompanied by a cervical radiculitis, which healed, reappeared and healed again in strict parallelism with the lung manifestations of syphilis.

Our thanks are due to Dr. J. F. Robinson, M.D., F.A.C.S., F.R.C.S.E., medical officer, Sri Krishnarajendra Hospital, Mysore, to our radiologist, Dr. A. C. Devaraj, and his assistant, Dr. Mohamed Aga.

REFERENCES

ALLISON, R. G. (1929) .. *Amer. J. Roentgenol. and Rev. Therap.*, **22**, 21.

ASSMANN, H. (1922) .. *Klinische Roentgendiagnostik.* Leipzig.

BOYD, W. (1935) .. *Pathology of Internal Diseases.* Henry Kimpton, London.

CLAYTOR, T. A. (1905) .. *Amer. J. Med. Sci.*, **129**, 563.

DENMAN, H. C. (1932). *Ann. Intern. Med.*, **5**, 895.

FREEDMAN, E., and HIGLEY, C. S. (1934). *Amer. J. Roentgenol. and Rev. Therap.*, **31**, 333.

HARTUNG, A., and FREEDMAN, J. (1932). *J. Amer. Med. Assoc.*, **98**, 1969.

HOWARD, C. P. (1924). *Amer. J. Syph.*, **8**, 1.

KARSCHNER, R. G., and KARSCHNER, C. F. (1920). *Ann. Med.*, **1**, 371.

MUNRO, W. T. (1922) .. *Lancet, ii*, 1376.

OSLER, W. (1916) .. *Principles and Practice of Medicine.* D. Appleton-Century Co., New York.

PEARSON, R. S. B., and DE NAVASQUEZ, S. (1938). *Guy's Hosp. Rep.*, **88**, 1.

PRICE, F. W. (1937) .. *Textbook of the Practice of Medicine.* Oxford University Press, London.

ROBINSON, W. W. (1935). *Radiology*, **25**, 596.

SANTE, L. R. (1936) .. *Annals of Roentgenology*, **11**, 368. Paul B. Hoeber, New York.

SHANKS, S. C., KERLEY, P., and TWINING, E. W. (1938). *Textbook of X-Ray Diagnosis*, **1**, 269. H. K. Lewis and Co., London.

STANLEY, J. D. (1911) .. *Brit. Med. J., ii*, 802.

SYMMERS, D. (1916) .. *J. Amer. Med. Assoc.*, **66**, 1457.

TICE, F. (1929). . *Practice of Medicine*, **5**, 571. W. F. Prior Co., Hagerstown.

WATKINS, W. W. (1921). *Amer. J. Roentgenol.*, **8**, 259.

WIGBY, P. E., and SANDERS, C. B. (1935). *Radiology*, **25**, 629.

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animals were changed over to the control diet. It was observed that they recovered slowly, and by about the 90th day the external symptom of the mottled condition disappeared almost completely.

Teeth formation in rats commences at a much earlier stage than in the ones used in the present experiments, so that it is possible, in the case of slightly older rats which were employed, there developed a reversible type of mottled condition which could be relieved considerably by changing over to fluoride-free water.

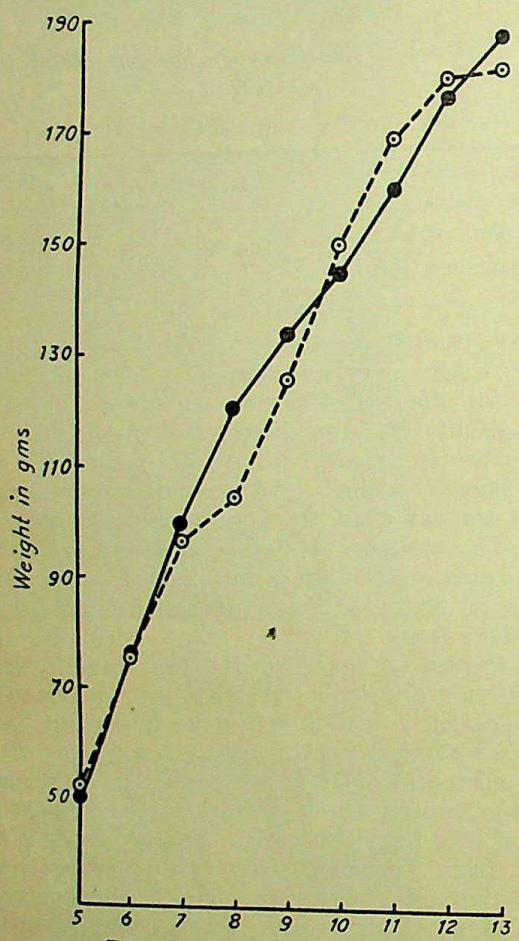

Fig. 7. Age of rats in weeks.

Attempts to check the development of mottled condition in rats.—A preliminary series of experiments was carried out with another batch of animals in three sets which were given the same basal diet but were given in addition (*a*) water containing fluoride in quantities corresponding to that observed in the Nagercoil water, (*b*) the same water as used in (*a*) *plus* calcium hydroxide in sufficient quantities to precipitate the fluoride as the calcium salt, and (*c*) water free from fluoride. The growth rates of the animals and also the condition of the teeth were examined from time to time (figure 8).

It was observed that, as in the case of the previous experiments, there was no significant difference between the growth rates of the experimental and control rats; and there was, however, no difference between the rats in the series (*a*) and (*b*) in relation to their mottled condition.

Conclusions.—In the case of humans, the development of the mottled condition through drinking fluoride-containing water (at any rate under the conditions prevailing in Nagercoil) appears to take place predominantly during the formative period of the teeth.

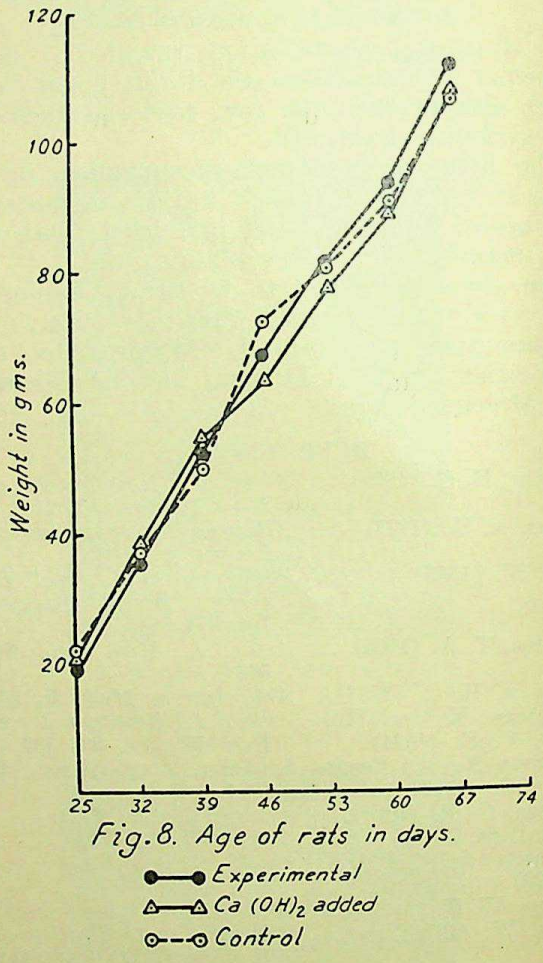

Fig. 8. Age of rats in days.

Experiments with 5 weeks old rats led to the production of a reversible type of mottled condition when fluoride-containing water was given to rats. The symptoms developed very rapidly and reached an advanced condition in about a month. On changing over to fluoride-free water, however, there was considerable recovery in about 90 days.

Addition of calcium hydroxide to water in quantities calculated to precipitate the fluoride does not seem to be efficacious in checking the incidence of the mottled condition in rats.

The author thanks Professor V. Subrahmanyan for his kind interest in this work.

REFERENCE

PILLAI, S. C. (1938) .. *Indian Med. Gaz.*, **73**, 408.

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A STUDY OF THE NORMAL BLOOD PRESSURE IN INDIANS

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Introductory.—So far as we know the standards of blood pressure for normal individuals in this country have not been worked out. The standards that are commonly referred to for medical and insurance purposes are not based on data collected in this country, but have been borrowed from the records of foreign insurance companies. The present study was carried out on 10,000 persons from different parts of India. Every attempt was made to select healthy and normal individuals between the ages of 15 and 80 years, from both the rural and the urban populations. The blood pressure was taken by means of a mercury baumanometer, the auscultatory method being employed to take the readings. The diastolic reading was taken at the point when all sounds disappeared. The ten thousand cases under investigation consisted of both males and females, and individuals belonging to different communities, religions and climatic zones. Thus, there were 8,105 males and 1,895 females. There were 3,550 Hindus, 3,365 Muslims, 1,690 Sikhs, 1,195 Christians and 200 Persians and Afghans. From the standpoint of climates, three main geographical regions, the north, east and south of India, were selected. There were thus 5,146 cases from the Punjab, Delhi and the United Provinces, and 714 cases from Nepal and other hilly areas; 3,522 cases were from Bengal, Bihar and Orissa, and 618 cases from Madras. An attempt to establish the average systolic and diastolic pressure of Indians, taking all these factors into consideration, and also the effect of age and diet on blood pressure, is the main object of this paper. Our findings are recorded in the tables.

In view of the fact that a comparison of these figures with those obtained in Europeans in similar age-ranges is important, table II, worked out by Symonds in 1923, is quoted.

The most prevailing systolic blood pressure amongst Indians ranges between 110 and 119 mm. Hg., 33.1 per cent against 17.0 per cent only for Europeans for the same range of pressure. The next commonest group amongst Indians consists of persons with systolic pressures between 100 to 109 mm. Hg., 20.6 per cent against only 3.5 per cent for Europeans. The majority of Europeans have higher systolic pressures than Indians. Thus, for the ranges of systolic pressure between 120 and 129 and 130 and 139 mm. Hg., relative frequency amongst Europeans is 31.3 and 23.3 per cent against 20.3 and 12.6 per cent for Indians. There were 78.6 per cent Indians who had their systolic blood pressure below 129 mm. Hg. as compared with 52.9 per cent for Europeans. In cases of higher ranges of blood pressure, *i.e.*, 130 to 170 mm. Hg., there were more Europeans, 47.1 per cent as compared with 21.4 per cent of Indians.

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TABLE I

Showing systolic, diastolic and pulse pressure means of Indians when worked out according to different age-ranges

Age-range years	Systolic pressure, mm. Hg.	Diastolic pressure. mm. Hg.	Pulse pressure, mm. Hg.
15–19	109.2	70.0	39.2
20–24	111.5	72.4	39.1
25–29	112.0	71.2	40.8
30–34	113.6	72.0	41.6
35–39	118.6	72.6	46.0
40–44	120.4	73.2	47.2
45–49	122.8	75.0	47.8
50–54	126.2	77.1	49.1
55–59	126.4	80.4	46.0
60–64	128.0	82.5	45.5
65–69	128.6	82.8	45.8
70 and above ..	130.2	83.0	47.2

TABLE II

Showing systolic, diastolic and pulse pressure means of healthy Europeans and Americans, when worked out according to different age-ranges

Age-range years	Systolic pressure, mm. Hg.	Diastolic pressure, mm. Hg.	Pulse pressure, mm. Hg.
15–19	123.5	79.5	40.0
20–24	124.2	80.5	43.7
25–29	124.5	81.5	43.0
30–34	125.1	82.3	42.8
35–39	125.3	83.3	42.0
40–44	126.4	84.0	42.4
45–49	128.2	84.7	43.4
50–54	130.2	85.9	44.3
55–59	133.5	86.8	46.7
60 and above ..	135.2	86.9	48.3

The average diastolic pressure of Indians ranges between 70 and 83 mm. Hg. This is 6 to 10 mm. Hg. lower than in Europeans but the difference is not so marked as in the case of the systolic pressure. The pulse pressure of Indians is also lower than that of Europeans. From 35 to 55 years of age this shows a sudden rise, followed by a subsequent fall.

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In table III the systolic, diastolic and pulse pressures of three groups of Indians have been compared with those of Europeans.

TABLE III

Showing the comparative systolic, diastolic and pulse pressure means of Europeans and different types of Indians

Race and climates	Average systolic pressure, mm. Hg.	Average diastolic pressure, mm. Hg.	Average pulse pressure, mm. Hg.
Indians as a whole ..	115.2	76.0	39.2
People belonging to the Punjab, the U. P. and Delhi Provinces.	116.2	76.4	39.8
People belonging to Bengal, Bihar and Orissa Provinces.	114.7	76.2	38.5
People belonging to Madras and Southern India.	115.0	75.2	39.8
Europeans	125.3	85.0	40.3

It will be observed that the average systolic pressure of northern Indians is somewhat higher than of eastern and southern Indians, 116.2 mm. Hg. against 114.7 and 115 mm. Hg., respectively. The average systolic pressure of Indians as a whole is 10.1 mm. Hg. less than that of Europeans. The average diastolic pressure is less variable amongst different Indian races but in the case of the Europeans, it is 9 mm. Hg. higher than in Indians. The variations in pulse pressure are relatively less marked. From the above findings it appears that the northern Indians hold an intermediate place in blood pressure between Europeans and Indians from the east and south.

Effect of diet on blood pressure.—It is an established fact that diet exerts a considerable influence on blood pressure and hyperpiesis is more frequent amongst heavy meat-eaters than amongst vegetarians. Though this hypothesis allows many exceptions it was deemed interesting to analyse this point. Accordingly, comparative blood pressure was recorded from people on mixed diet and people strictly vegetarian. The following table represents these findings :—

TABLE IV

Showing the effect of diet on blood pressure of Indians

Diet	Average systolic pressure, mm. Hg.	Average diastolic pressure, mm. Hg.	Average pulse pressure, mm. Hg.
People on mixed diet ..	118.7	72.3	46.4
Vegetarians ..	116.2	72.5	43.7

It will be seen from this table that people on a mixed diet have slightly higher systolic and pulse pressures than those on pure vegetarian diet, the differences being at least 2.5 mm. Hg. for the systolic pressure. The diastolic pressure is almost identical in both these groups.

Blood pressure in females.—Blood pressure in females could not be so thoroughly studied as in the male. It was, therefore, difficult to place them in the tables above. The amount of data collected in Symond's table and also by ourselves showed that the average systolic pressure in European females between the ages of 15 and 70 years was roughly about 127.6 mm. Hg. against 115.4 mm. Hg. in Indian females. The average systolic and diastolic pressures in Indian females on a mixed diet were 115.4 and 70.2 mm. Hg., respectively, whereas those in vegetarians were 110.2 and 68.2 mm. Hg.

Summary and conclusions.—The figures available in this country regarding standard blood pressure for Indians have been controversial. It was, therefore, considered advisable to undertake this survey along with the field work in connection with Drug Addiction Inquiry. The authors have examined ten thousand healthy Indians of all ages, sexes and castes from different parts of the country. Many of these cases were under observation from time to time for several years.

From the data we have collected, the following tentative conclusions can be drawn :—

1. The average systolic pressure in Indians is lower than that in Europeans. For any age-range previously enumerated this difference varies from 5 to 14 mm. Hg. About 53.7 per cent of Indians have their systolic pressure between 100 and 119 mm. Hg. against 20.5 per cent Europeans for the same range. For higher ranges, *e.g.*, 120 to 139 mm. Hg., the percentage of Europeans increases up to 54.6 against 32.9 only for Indians.

2. The average diastolic pressure of Indians is also lower than that of Europeans. This is approximately 8 to 9 mm. Hg. less. The pulse pressure naturally is also proportionately low but between the ages of 35 to 60 years it attains almost the same height as in Europeans.

3. Amongst the various communities in India, it has been found that the people of the north (Punjab, U. P. and Delhi) do have higher systolic and diastolic pressures than the people of the east (Bengal, Bihar and Orissa) and south (Madras). The bracing climate of the north, better diet and higher standard of living would possibly account for this difference.

4. People on mixed diet have slightly higher blood pressure than those on a purely vegetarian dietary.

REFERENCE

SYMONDS, B. (1923) .. *J. Amer. Med. Assoc.*, **80**, 232.

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STERILIZATION OF SNAKE VENOM PREPARATIONS

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Introduction.—Snake venom is a secretion from the specialized glands in the mouth of the snake, analogous to the salivary glands of other animals. (The venom itself is a complicated protein and behaves like an enzyme.) It is a neurotropic poison which is also endowed with digestive functions. Its strong proteolytic properties are well known. A rat after being swallowed whole by a snake is completely digested in the gastro-intestinal tract, the ejected fæcal matter being only a small ball of hair and nails.

Recent investigations on venoms have enabled the identification of a number of active constituents, namely, coagulative, hæmolytic and neurotoxic principles. These active principles are now being used in therapeutics for different disease conditions. All these isolated principles are used parenterally and, as such, the sterility of these preparations is both urgent and important. There are certain difficulties to overcome because most of the available methods of sterilization act injuriously on these principles and reduce or destroy their potency.

Different methods for the sterilization of venom

1. *Sterilization by heat.*—Rosenfeld and Lenke (1935) reported that sterilization by heat or ultra-filtration seriously damaged the clotting power of tiger-snake venom. They, therefore, made a solution of the venom in physiological saline and added sodium merthiolate, 0.01 per cent, as a preservative. The preparation was stored in an ice-chest for 2 days and found perfectly sterile during the subsequent tests. They reported that this was quite a satisfactory method for tiger-snake venom used for the treatment of hæmorrhage. Grasset (1936) reported that heating of cobra venom at 75°C., destroyed its hæmorrhagic but preserved the neurotoxic principles. Macht (1936) obtained bacteria-free venom by dissolving dried venom in a sterile normal saline solution, and then sterilizing the ampoules at a temperature not exceeding 60°C. These ampoules, when stored in the refrigerator, retained their sterility and potency for many months.

2. *Sterilization by desiccation.*—Some manufacturers supply concentrated venom in sealed ampoules after drying it in a vacuum desiccator. The venom so kept is believed to retain its potency indefinitely and it remains bacteria-free. Normal saline is added and fresh solution is prepared from the ampoules at the time of injection. Since the authors did not test the sterility of these preparations, it is not possible to comment on their sterility.

3. *Sterilization by antiseptics.*—Grasset and Zoutendyk (1935) reported that cobra and Russell viper venom, when treated with 1 per cent formalin and kept at 37°C. for 3 weeks, were both sterile and detoxicated. In this condition rabbits could easily stand 100 MLD of cobra venom and 200 MLD of Russell viper venom. Some workers have suggested that 0.5 per cent phenol and 10 per cent glycol (or glycerine) or addition of tricresol were useful preservatives against contamination by non-sporing organisms.

4. *Sterilization by filtration.*—Berkefeld Seitz or ultra-filters are known to hold back bacteria and spores. This method, therefore, is often recommended for sterilization when chemical agents cannot be used. The filtration method is generally used for sterilizing sera and antivenene. The same method could be utilized for the sterilization of snake venoms but it is doubtful if the large globulin molecules of snake venom will pass through the filters. Chopra and Roy (1936), while studying the hæmolytic properties of snake venoms, observed that cobra venom solutions, after passing through a Seitz filter, lost their hæmolytic properties. Sheep corpuscles, which are usually resistant to cobra and Russell viper venoms but are markedly hæmolysed in the presence or a trace lecithin, were found to be unaffected by the filtered venoms in the presence of various concentrations of lecithin. One of the writers (J.S.C.) further observed that the action of the filtered venom on the respiratory centre was considerably diminished but its proteolytic properties remained intact. In our recent experiment on the thrombin content of venoms, it was observed that cobra venom after 2 or 3 filtrations entirely lost its thrombin activity.

Method of venom preparation

For preparing snake venom solutions for therapeutic use Chopra and Chowhan (1937) dried it in a desiccator over calcium chloride or concentrated sulphuric acid, until a constant weight was maintained for 3 successive days. The dried venom was dissolved aseptically in sterile normal saline, shaken for half an hour daily for 3 days and kept in the refrigerator for the rest of the time. When the venom had thoroughly gone into solution more sterile saline was added to it till a concentration of 1/10,000 was obtained. Then 0.25 to 0.5 per cent phenol was added to the solution as a preservative. The solution was standardized and its potency worked out in mouse units (a mouse unit being the maximum amount of venom which does not kill a 20 gm. white mouse in 24 hours). The

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solution was stored in a refrigerator for 3 to 6 days and finally tested ærobically and anærobically. Most of our samples, prepared during the last 4 years by this method, proved perfectly sterile and retained intact all the active principles of the venom.

Defect of the method

The success of the above method depends largely on the process of collection of the venom. The results previously reported were obtained with venoms supplied by the Haffkine Institute, Bombay, which are collected with proper aseptic precautions. Since the beginning of 1940 venoms were obtained from the local market in Calcutta. Solutions made with these venoms, when tested for sterility by the bacteriological laboratory, were found to be contaminated, more often Russell viper venom solutions but the cobra venom solutions as well.

Dry cobra and Russell viper venoms from these sources were also contaminated. These contaminated venoms regained their sterility on being treated with ether for 3 days, dried and then made into solution. It was thus clear that venoms supplied from the local market were grossly contaminated and could not be sterilized by the method we used.

Quality of venom preparations on the market

At this time we received reports that various injectable preparations on the market, though supposed to be sterile, were also found to be contaminated. A number of venom products manufactured locally in Calcutta, which were examined, was also contaminated with ærobic organisms and, on plating, gram-positive rods were detected. Pasricha and Abedin (1941) in India and Kellaway and Williams (1933) in Australia tested batches of commercial preparations of snake venoms containing 10 per cent glycerine and sufficient concentration of phenol to kill other than non-sporing organisms. Viable spores were identified and *Bacillus subtilis, Vibrion spetique,* and a bacillus resembling *Bacillus cochlearius* were isolated. The probable source of contamination seemed to be in the venom itself.

Suggestions for improvement

Fairley and Splatt (1929) and Williams, Freeman and Kennedy (1934) reported that the yield of snake venoms is altered in quality, quantity and physical characters after the snakes are kept in captivity for a long time. The bacterial flora of the mouth of Australian venomous snakes, when kept in captivity or after frequent extractions of venoms, were very much increased. *Bacillus proteus* and a small gram-negative coccobacillus were frequently present. Anærobic non-lactose fermenters, *B. proteus, B. pyocyaneus, B. alkaligenes fæcalis,* coliform bacilli and staphylococci were also occasionally isolated. Drying appeared to kill many of these non-lactose fermenters. The mouth of recently caught snakes is practically free from bacterial contamination. Snakes kept in healthy, well-drained and open parks and under as natural conditions as possible, also have their buccal cavity relatively sterile. The venom obtained from these snakes, and thoroughly dried, can be considered practically sterile, and solutions made out of it aseptically with tricresol or phenol in 0.25 to 0.5 per cent as preservatives would generally be sterile.

Experimental

The following methods used for sterilization of venoms were tested:—

1. *Heat method:* The venom consists of neurotoxin, hæmolysin and esterase. Of these the neurotoxin is stable up to 70°C., hæmolysin is reduced at 100°C. (15 minutes' contact) and esterase activity is destroyed at 56°C. in half an hour. Prolonged heating of cobra venom converts it into lysocythin with marked fibrolytic properties. It was, therefore, decided to sterilize the venom preparations by the method of *tyndallization* or fractional sterilization. In this process the venom solution was heated at 60°C. for one hour daily for 3 days on a water bath and kept in a refrigerator for the rest of the period. It was then tested for sterility and strength. This process allowed spores to develop vegetative forms which were subsequently destroyed by the above temperature.

2. *Chemical antiseptic method:* Phenol in 0.25 to 0.5 per cent concentration, tricresol (cresol B. P. cresylic acid) in 0.25 to 0.5 per cent or sodium merthiolate in 0.01 per cent concentration has been recommended as suitable antiseptics for venom solutions. These antiseptics were at first diluted in normal saline solution and then added drop by drop to the whole bulk. The preparation was kept in a refrigerator for 3 days and then tested for toxicity and sterility.

3. *Filtration method:* Seitz, Berkefeld and Sinter glass filters were utilized for this study and filtrates collected into sterile receptacles. To obviate the difficulty arising out of the adsorption of large protein molecules responsible for the coagulating effect of the venom, the following corrections of the method were made :—

Reduction of the size of the filter disc.

Rejection of the first 16 to 20 c.cm. of the filtrate.

Use of fused glass-wool filters to avoid adsorption through the pores.

Experimental details

By following the foregoing methods both cobra and Russell viper venoms were studied from the standpoint of toxicity and sterility. This latter part of the work was done under the

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direction of Major C. L. Pasricha, I.M.S., in the Department of Bacteriology and Pathology. The toxicity tests were conducted in our own laboratory.

Cobra and Russell viper venoms were diluted to 1 in 10,000 and 1 in 2,000 respectively in sterilized normal saline solutions and their relative toxicities studied before and after sterilization by the methods mentioned above. Injections were made deeply into the pectoral muscles in the case of cobra venom solution and the death rate after 24 hours recorded. Russell viper venom was injected into the left wing vein of the animal and the number of deaths occurring within 15 minutes were counted. The MLD for each batch of solution was worked out from this. Tables I, II and III represent these results.

TABLE I

Effect of different methods of sterilization on the toxicity of cobra venom (dilution 1 in 10,000)

	Methods of sterilization			
	Phenol	Sodium merthiolate	Tyndallization	Control
MLD pigeons, mg.	0.1–0.2	0.1–0.2	0.1–0.2	0.1–0.2
Death interval.	1½ hours	3 hours	1½ hours	1–2 hours

TABLE III

Effect of different methods of sterilization on the sterility of cobra and Russell viper venoms (dilutions 1 in 10,000 and 1 in 2,000 respectively)

	Methods of sterilization	Organisms			
		24 hours later		7 days later	
		Ærobic	Anærobic	Ærobic	Anærobic
Cobra venom 1 in 10,000.	Phenol ..	0	0	0	0
	Sodium merthiolate ..	0	GF	0	0
	Tyndallization	0	0	0	0
Russell venom 1 in 2,000.	Phenol ..	0	0	0	0
	Sodium merthiolate ..	0	0	0	0
	Tyndallization	+	+	+	+

GF = gas formers; + = present; 0 = absent.

It appears that both tyndallization and phenol 0.5 per cent proved effective in rendering the cobra venom solution sterile. Sodium merthiolate 0.01 per cent rendered it sterile ærobically, but did not kill the anærobic organisms in 24 hours. They were, however, absent after 7 days. As for Russell viper venom both phenol and sodium merthiolate rendered the solution perfectly sterile; tyndallization, however, had no effect on ærobic and anærobic organisms.

TABLE II

Effect of different methods of sterilization on the toxicity of Russell viper venom (dilution 1 in 2,000)

	Methods of sterilization					
	Phenol	Sodium merthiolate	Tyndallization	Filtration		Control
				Once	Twice	
MLD pigeons, mg.	0.005–0.008	0.02–0.03	0.008–0.01	0.025–0.03	0.15–0.3	0.005?–0.008
Death interval	5–15 minutes	4–24 hours	3–4 minutes	5–10 minutes	24–74 hours	5–15 minutes

It is evident from table II that, as in the case of cobra venom, methods of sterilization by phenol and tyndallization do not materially modify the toxicity of Russell viper venom. This is, however, not the case with sodium merthiolate which considerably reduces the toxicity of this venom. So far as the filtration method is concerned (Seitz filter by suction) it very much reduces the toxicity of venom. The first filtration reduces it to one-third and the second filtration to one-tenth of its strength.

Summary and discussion

We have already seen that of the four methods of sterilization tyndallization was found to be the most unsatisfactory for Russell viper venom. This was possibly due to the fact that this venom is contaminated even in the dry form. The process of filtration appeared to be satisfactory from the point of view of sterility but it markedly altered the toxicity of the venom.

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A NOTE ON EUCODAL HABIT IN INDIA

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Introduction

EUCODAL is a synthetic German product belonging to the morphine series and is used for its analgesic effect. After the Great War of 1914–18, a number of cases of addiction to this drug came to our notice in India. Some of these came for treatment on account of the difficulty in obtaining the drug. Others were detected in a peculiar manner. One of the authors found a person buying empty packing boxes of eucodal from a firm of chemists in Calcutta. On inquiry it was found that these boxes were filled with ampoules of other narcotic drugs such as morphine and sold as eucodal at exorbitant prices. It was also learnt that some well-to-do people were in the habit of using this drug for its euphoric and supposed aphrodisiac properties. The 'Controller of Prices' in Calcutta has recently prosecuted a firm of pharmaceutical chemists under the Defence of India Rules for selling a box of eucodal ampoules for Rs. 50. These instances show that the drug is being used in this country by a section of the population who are in a position to pay high prices for it.

Chemical nature and medicinal properties.—Eucodal (dihydroxycodeinone) is a derivative of the opium alkaloid, thebaine, and resembles dicodide (dihydrocodeinone) in some respects. Pharmacologically it is more active than dicodide, its activity approaching that of morphine. Eucodal is a powerful analgesic and narcotic. Its narcotic effects are stronger than those of morphine but are shorter in duration—4 to 6 hours instead of 8 to 12 hours. In small doses, it has a soothing action on the central nervous system resulting in hypnosis and slowing of the pulse and respiration. Relief of bodily fatigue and a sense of security are also observed. In larger doses, vertigo, agitation, myosis and even convulsions are produced. It is a cardiac depressant and may reduce blood pressure considerably. The bowels are not constipated by eucodal.

Place of eucodal as a substitute for opium alkaloids.—A comparative study of eucodal, morphine, heroine, codeine and dionine demonstrates that this group of opium derivatives has certain resemblances and contrasts: amongst them the action of morphine and eucodal are the most alike, the initial stage of agitation being absent in eucodal though the narcotic and analgesic effects are stronger. With regard to their analgesic effect, in the decreasing order of potency the opium derivatives hold the following position: eucodal, morphine, heroine, codeine and dionine. So far as production of euphoric effects is concerned, morphine and heroine are superior to eucodal but codeine and dionine are inferior to it. As a cough reliever, eucodal is less efficacious than codeine and morphine; as respiratory depressant, which is also an index of toxicity for this group of drugs, heroine holds the topmost place, eucodal, morphine, codeine and dionine coming in order of their potency.

Eucodal habit.—It was generally believed that this drug was not liable to produce habit formation in the same way as morphine. It has, however, been found that this belief is not justified. There is practically no difference between morphine and eucodal in this respect and its sale should be submitted to the same restrictions. The withdrawal symptoms are also practically the same and cardiac weakness, irritability, suicidal tendencies, loss of appetite, diarrhœa, and craving for the drug are present. After complete withdrawal some amount of selfcentredness persists. Itching of the skin with urticarial rashes was observed in one of our cases. When the drug was given to relieve pains of dysmenorrhœa in young girls suffering

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The filtration method is effective but it reduces the therapeutic efficiency of the preparation. Sterilization by sodium merthiolate, phenol or tricresol is the more suitable method and keeps all the active principles of venom intact. Particular care has, however, to be taken with regard to the collection of the material and the preparation of venom solution. If this is not done, serious consequences may follow from the use of contaminated venom solutions.

Conclusions

(1) Snake venom preparations are often contaminated, hence their sterilization is indispensable.

(2) Venom milked from snakes kept in captivity and from badly handled snakes is usually contaminated.

(3) Filtration, though recommended as the best method for sterilization, has been found to hold back some of the active principles of venom.

(4) Preparation of venom solution from properly collected venom with all aseptic precautions, and by the addition of phenol or sodium merthiolate as preservative, is very satisfactory and keeps the venom solution bacteria-free.

REFERENCES

CHOPRA, R. N., and CHOWHAN, J. S. (1937). *Indian Med. Gaz.*, **72**, 339.
CHOPRA, R. N., and ROY, A. C. (1936). *Ibid.*, **71**, 21.
FAIRLEY, N. H., and SPLATT, B. (1929). *Med. J. Australia, i*, 347.
GRASSET, E. (1936) .. *Quart. Bull. Health Organization League of Nations*, **5**, 367.
GRASSET, E., and ZOUTENDYK, A. (1935). *Trans. Roy. Soc. Trop. Med. and Hyg.*, **28**, 391.
KELLAWAY, C. H., and WILLIAMS, F. E. (1933). *Med. J. Australia, i*, 581.
MACHT, D. I. (1936) .. *Proc. Nat. Acad. Sci.*, **22**, 61.
PASRICHA, C. L., and ABEDIN, Z. (1941). *Indian Med. Gaz.*, **76**, 276.
ROSENFELD, S., and LENKE, S. E. (1935). *Amer. J. Med. Sci.*, **190**, 779.
WILLIAMS, F. E., FREEMAN, M., and KENNEDY, E. (1934). *Med. J. Australia, ii*, 190.

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from anæmia, it caused a sense of mental apprehension, exhaustion, giddiness, sweating and a desire to sleep.

Doses.—The doses taken by individuals in our series were generally within the therapeutic limits, *i.e.*, 0.03 gm. (½ grain) once or twice a day. But when it was taken parenterally, 1 c.cm. or 2 c.cm. ampoules containing 0.01 to 0.02 gm. (1/6 to 1/3 grain) of the alkaloid were used. According to Falk (1919), 0.02 gm. is a more suitable dose for its analgesic effect than 0.01 gm. It seems that 0.005 gm. of eucodal corresponds in its effects to 0.01 gm. of morphine or 0.03 gm. of codeine.

Discussion

According to Wolff (1928), cases of addiction to this drug originally came into being during the last Great War. Koenig (1919) first described a case of eucodalism and reported symptoms similar to those of morphinism. Amongst the cases that have come under our observation in India, there were two individuals who exhibited a craving for the drug and feeling of malaise when the drug was not forthcoming. Both these patients had been taking the drug for more than two weeks. Falk (1927) and Baumm (1919) could find no marked abstinence symptoms. We have, however, observed abstinence symptoms in our cases, very similar to those found with morphine and it is often difficult to differentiate one from the other. The ideas flow very rapidly and there is difficulty in concentration. Neurotic symptoms are more common with eucodal in its fully developed stage than in the case of morphine. During the withdrawal period the addict fails to appreciate his position, there is a feeling of apprehension, impending death and suffocation, and pseudo-anginal attacks may also occur. Lemperg (1936) observed a doctor aged 33 who took 9.0 gm. of eucodal per day. He was irritable and even dangerous for his patients. He became ataxic during the withdrawal period and died on the thirteenth day of the course of treatment. In Indian addicts the withdrawal was effected without much difficulty.

Conclusion.—Though eucodal has certain advantages over morphine, the possibility of contracting a habit from it is not less serious than from morphine or heroine. Fortunately the drug is not available at present owing to war conditions.

REFERENCES*

BAUMM, F. (1919) .. Unsere Erfahrungen mit Eukodal. *Ther. Monatsh.*, **6.**

FALK, E. (1919) .. Ueber Eukodalismus. *B. Kl. W.*, **14,** 446.

Idem (1927) .. *Mercks Annalen*, **1,** 14.

KOENIG (1919) .. Eukodalismus. *B. Kl. W.*, **14,** 320.

LEMPERG, F. (1936) .. Tod durch Eukodalismus. *Zbl. f. Inn. Med.*, **3.**

WOLFF, P. (1928) .. Zur Behandlung und Bekämpfung der Alkaloidschten. *D. M. W.*, Nos. 1–10.

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PASTEURELLA PSEUDOTUBERCULOSIS 'SWARMING COLONIES'

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DURING experiments designed to demonstrate the motility of *Pasteurella pseudotuberculosis* macroscopically it was noted that when this organism is inoculated on the surface of nutrient agar (0.5 to 1 per cent) and incubated at room temperature (70° to 80°F.) it grows in the form of spreading colonies similar to the 'swarming' *Proteus* colonies. When incubated at 37°C., the growth is limited to the area of the inoculum. At room temperature the growth continues to spread for three days. If a plate that has been incubated at room temperature and shows a spreading form of growth is subsequently incubated at 37°C., the further 'swarming' of the colony stops. A colony grown at 37°C., and restricted mainly to the area of inoculation, when incubated at room temperature, spreads over the surface of the medium. Smears made from the margin of a swarming colony show actively motile bacilli, but smears from the centre of the colony show mainly non-motile forms. Smears from the growth incubated at 37°C. show no motility. When stained for flagella by the Plimmer and Paine (1921) method, the growth from the edge of the colony incubated at room temperature shows the majority of the organisms with two polar flagella, whereas the growth from the centre of such a colony or from a growth at 37°C. shows no flagella.

The growth incubated at 37°C. is more opaque than the growth at room temperature.

The spreading of *Past. pseudotuberculosis* is well seen in stab cultures in semi-solid agar incubated at room temperature, whereas it is absent in similar cultures incubated at 37°C. Another point of interest noted in growth on ½ to 1 per cent agar incubated at room temperature is that certain of the strains are contaminated with bacteriophage (a number of bacteriophage colonies develop in the growth), whereas in the restricted growth at incubator temperature bacteriophage colonies are not seen.

REFERENCE

PLIMMER, H. G., and PAINE, S. G. (1921). *J. Path. and Bact.*, **24,** 286.

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*It was not possible to put these in the usual form as they could not be consulted in the original. They are therefore, put in the form in which they appear in the 'Technical Study of the Comparative Effects of Morphine and of certain Habit-forming Drugs: Eucodal, Dicodide, Dilaudide, Acedicone', *Bulletin of Health Organization*, League of Nations (1939), **8,** 387.—EDITOR, *I. M. G.*

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OBSERVATIONS ON SOME IMMUNOLOGICAL ASPECTS OF *LEPTOSPIRA ICTEROHÆMORRHAGIÆ*

PART III

DEVELOPMENT OF ACTIVE IMMUNITY IN MAN FOLLOWING THE INJECTION OF LEPTOSPIRA VACCINE

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ACTIVE immunization against leptospiral infection was first demonstrated by Ido *et al.* (1916). They successfully immunized guinea-pigs with killed leptospira in the liver emulsions of infected guinea-pigs. Noguchi (1918) employed leptospira cultures instead of infected liver emulsion, and found that the inoculation of the killed cultures in sufficient quantities afforded complete protection to the same animals against a subsequent infection with virulent cultures of both homologous and heterologous strains. On account of the encouraging results obtained with guinea-pigs, miners in Japan have been inoculated with killed cultures and satisfactory protection results claimed. For example, Wani (1933) inoculated several miners and noted that in one mine and during the same period five cases occurred among 3,655 vaccinated and 70 among 6,266 non-vaccinated miners.

As recorded by Walch-Sorgdrager (1939), 20 persons were inoculated in Amsterdam and 18 of them showed titres of at least 1 in 100; the other two (one of which had received only one injection) did not develop any demonstrable titre.

Uhlenhuth and Zimmermann (1934) immunized three of their staff with 2 doses of vaccine injected at an interval of a week. Two weeks after the second injection the sera in one of them reacted to titres of 1 in 100 and in the other to 1 in 50, but neither protected guinea-pigs against a virulent culture.

Van Thiel (Walch-Sorgdrager, 1939), on the other hand, has noted that even when the serum showed a low titre, it protected guinea-pigs against virulent cultures.

Smith (1937) inoculated 122 persons with killed virulent and non-virulent cultures of *L. icterohæmorrhagiæ*. The blood samples of only 48 persons were available later for testing the serum reaction. In one it reacted to a titre of 1 in 10 only and in 11 to a titre of 1 in 30. All the remaining persons showed no evidence of the production of demonstrable immune bodies. It appears from the above brief review that the results obtained by different workers are not in agreement. In the hope of clearing up the apparent discrepancies we undertook the following investigation and for this purpose we utilized some members on our staff and some kala-azar convalescents who had completed their courses of treatment.

Materials and methods

A strain of classical *L. icterohæmorrhagiæ*, which was isolated locally from a severe case of hæmorrhagic jaundice, was used. The virulence of the strain was maintained by frequent passages through young guinea-pigs. The spirochæte was cultivated in the medium advocated by the Dutch workers in Amsterdam*. The cultures were incubated for 24 hours at 37°C. and then kept at laboratory temperature (22°C. to 30°C.) for about a week. The contents of several tubes were pooled and centrifuged for an hour at the rate of 8,000 revolutions per minute. (It is important to note that it is useless to centrifuge at low speed, because the leptospiræ do not come down except at high speeds.) After centrifugalization most of the upper portion of the fluid, which is practically free from the spirochætes, was removed as quickly as possible. The remaining portion, showing a high concentration of the organism, was phenolized so that the culture contained 0.5 per cent phenol and it was used as a vaccine. But it was soon noticed that after treatment with phenol the organisms were disintegrated, rendering their enumeration impossible. Formalin (0.3 per cent) which well preserves the integrity of the spirochætes was, therefore, substituted.

As the growth of the leptospira does not produce any appreciable turbidity in this medium standardization of the vaccine by comparison with opacity tubes (Brown's method) was not applicable and Wright's laborious method of enumeration of micro-organisms against red blood corpuscles had to be resorted to. Even this method did not yield satisfactory results; for the spirochætes often formed large clumps, thus rendering the counts difficult and the distribution uneven. Each cubic centimetre of the vaccine contained approximately 100 million spirochætes. Before inoculation each brew was tested for sterility by cultural examination and guinea-pig inoculation. The method employed in vaccination consisted in giving of 1 c.cm. (100 million organisms) subcutaneously, followed by another dose of double quantity at an interval of a week. From 10 to 12 days after the second inoculation a specimen of blood was

* The preparation of the medium is as follows:—
Tap water, 1,500 c.cm.
Peptone (Witte), 1.5 gm.
Add normal phosphoric acid until pH = 7.
Boil.
Add 300 c.cm. of Ringer's solution and 150 c.cm. of Sörensen buffer mixture (pH 7.2).
Boil until precipitation is complete.
Filter.
Check pH and readjust, if necessary.
Place 5 c.cm. in each long narrow tube.
Autoclave.
Add 0.5 c.cm. of fresh sterile inactivated rabbit's serum.
Test sterility.

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obtained and tested for the presence of agglutinating and protective antibodies.

Results

Eight members on the staff were vaccinated as detailed above; the serum of one reacted to a titre of 1 in 1,000, four to a titre of 1 in 300 and two to a titre of 1 in 100. These sera also afforded effective protection to guinea-pigs, while all the control animals receiving normal human serum before infective inoculation, succumbed to leptospiral infection. The serum of the remaining person showed neither any demonstrable agglutinating titre nor protective action on the guinea-pig. After 11 months these seven men were examined again for evidence of the persistence of immune bodies and it was found that the agglutinating titre had fallen to 1 in 20 in one case and to 1 in 10 in another, and the remaining persons showed no demonstrable serological titre.

It is interesting to note that the serum of the person showing a drop in the agglutinating titre from 1 in 1,000 to 1 in 20 was still protective against a fatal dose of a virulent culture in a guinea-pig.

In the second series of 12 persons convalescent from kala-azar, the serum of two had a titre of 1 in 200 and in another it was only 1 in 80. These three sera contained sufficient antibodies to protect guinea-pigs against a virulent culture. All the rest gave no immunizing response whatever to the vaccination, although the same brews of the vaccine were used for the second series.

Conclusions

(1) Nearly all healthy individuals can be successfully immunized against *L. icterohæmorrhagiæ* by vaccination.

(2) The serum of people thus immunized, even when showing a low agglutinating titre, is capable of protecting the guinea-pig against virulent culture (homologous strain).

(3) In the blood of the vaccinated persons immune bodies (agglutinins and protective antibodies) do not seem to persist longer than 11 months.

(4) It seems that kala-azar convalescents are unsuitable for testing the effectiveness of leptospira vaccine.

Our thanks are due to Dr. L. E. Napier, for allowing us to perform the experiment on some of his kala-azar patients, and to Dr. A. K. Hazra, of Messrs. Bengal Chemical & Pharmaceutical Works, Calcutta, who helped us in many ways in connection with this investigation, especially in the matter of having the leptospira emulsions centrifuged with a high-speed machine belonging to his firm. Also to Mr. R. L. Sen, B.SC., for his valuable help.

REFERENCES

IDO, Y., HOKI, R., ITO, H., and WANI, H. (1916).	*J. Exper. Med.*, **24**, 471.
NOGUCHI, H. (1918) ..	*Ibid.*, **28**, 561.
SMITH, J. (1937) ..	*J. Hyg.*, **37**, 261.
UHLENHUTH, P., and ZIMMERMANN, E. (1934).	*Med. Klin.*, **30**, 464.
WALCH-SORGDRAGER, B. (1939).	*Bull. Health Organization, League of Nations*, **8**, 143.
WANI, H. (1933) ..	*Zeitschr. Immunitats-forsch. u. Exper. Therap.*, **79**, 1.

A Mirror of Hospital Practice

A HYDATID CYST OF THE SPLEEN

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S. L., male, aged 45, was admitted into the Patna Medical College Hospital on 19th August, 1941, with the complaint of a lump in the abdomen for a year.

Examination.—Patient was of average build. Temperature normal, pulse 80, respiration 24, blood pressure 130/85. There was a lump in the left hypogastrium, globular in shape, extending from the left costal margin down to the umbilicus and from the left flank to the middle line. It was found to be incorporated with the spleen and was cystic in nature. There was no hydatid thrill. No abnormality could be detected in any other system.

Investigations.—Blood: Total erythrocytes—3,840,000; total leucocytes—8,800; polymorphonuclears—68 per cent; large mononuclears—2.5; lymphocytes—20.5; eosinophiles—8.0; basophiles—1.0.

No abnormal cells seen. Serum aldehyde and serum antimony tests—negative.

Wassermann reaction—negative.

Stool—nothing abnormal.

Casoni's intradermal test—doubtful.

Diagnostic puncture was done—fluid slightly turbid. There was a trace of albumin, a heavy amount of chloride, a trace of urea, and Benedict's solution was reduced. On microscopic examination—numerous erythrocytes and a large number of the scolices of *Tænia echinococcus* were found.

The patient was operated upon and splenectomy was done.

Comments

1. Hydatid disease is rare in India. Hydatid cyst of the spleen is very rare even in places where the disease is common.

2. Clinically it could not be diagnosed as hydatid cyst of the spleen. Eight per cent eosinophilia could not be taken into account as it has no importance in the tropics. Further, Casoni's test, which is said to be positive in 90 per cent of cases, was doubtful.

4. Exploratory puncture had to be done because of the uncertainty of the diagnosis.

5. In the pathogenesis of hydatid disease the embryos are carried in the portal vein to the liver and through the liver to any other part of

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the body and produce cysts. It was peculiar in the present case that no other site showed hydatid cysts. As it has to pass the filter of the liver one would naturally expect it to be affected as well, but in this case it was free.

Acknowledgments

Our thanks are due to Captain R. P. Ghosh, superintendent, Patna Medical College Hospital; Dr. T. N. Banerji, professor of medicine; Dr. S. M. Ghosal, lecturer in children's disease and medical registrar; and Captain N. Pal, M.B., F.R.C.S.E., professor of surgery, P. W. Medical College, Patna, for permission to report the case.

A CASE OF ACUTE HÆMORRHAGIC PANCREATITIS

By A. G. PEREIRA, L.M. & S.

District Medical Officer, Coimbatore

K. I., male, aged 45, was admitted into the Government Headquarters Hospital, Coimbatore, on 30th June, 1941, with a history of sudden intense pain in the abdomen which started just above the umbilicus, shooting through to the back and loins. The pain started at about 8 a.m. after breakfast on 29th June. It steadily increased. He vomited bile-stained fluid 3 or 4 times. Signs of collapse were present; bowels moved once.

No history of similar attack before; no history of gastric or duodenal ulcer; no biliary colic; non-alcoholic; no history of any acute infectious fevers; complained of occasional 'indigestion'; no history of trauma.

The patient was thin and pale. He appeared very ill, rolling in bed with excruciating pain in the abdomen. Breathing was rapid, he had an anxious look, there was no cyanosis and his tongue was dry.

Abdomen was much distended and rigid; tenderness all over the abdomen, more marked in the epigastric region and right iliac fossa; shifting dullness present; pulse rapid; heart and lungs normal. Temperature 101°F.; pulse 98; blood pressure 140/100; urine normal. The pain was coming on frequently and he had to be given injections of morphia.

On 2nd July under spinal anæsthesia the abdomen was opened by a right paramedian incision. Blood-stained fluid escaped out of the abdominal cavity and the cavity was mopped dry. Stomach and duodenum were examined for any perforation. Generalized peritonitis was present. There was a generalized inflammation of all the structures and inflammation of the whole pancreas was obvious. The head, body and tail of the pancreas were very much swollen and hard, and there were numerous hæmorrhagic spots all over its surface. There was no fat necrosis. The abdomen was closed, with a drainage tube in the right flank and another in the epigastric region reaching up to the head of the pancreas.

He was given sulphonamide injections once a day for four days. Sulphonamide tablets 2 *t.d.s.* for four days and symptomatic treatment adopted.

By the 5th or 6th day the temperature touched normal. The patient felt better day by day. Blood-stained fluid drained out through the drainage tubes. The tenderness in the abdomen gradually subsided. The distension and the pain lessened. The drainage tube in the flank was shortened gradually and by the 12th day the wound closed. The epigastric drainage tube was discharging blood-stained fluid till about the 30th day and then the wound gradually healed. No fat necrosis was noted.

Discharged well on 12th August.

TREATMENT OF SMALLPOX WITH AN ANTIGEN-ANTIBODY MIXTURE

By G. PANJA, M.B. (Cal.), D.Bact. (Lond.)

Officiating Professor of Bacteriology and Pathology

and

N. N. DAS, M.SC., M.B.

(*From the School of Tropical Medicine, Calcutta*)

VACCINIA virus has long been used as a prophylactic against smallpox but it has not been used as a cure in this disease. A mixture of vaccinia virus and serum from convalescent smallpox cases was tried in a small number of smallpox cases at the Campbell Hospital, Calcutta, early this year when the epidemic was at its peak.

Five cases of the severest confluent type were selected for our experiment. The results were encouraging. An example of one case is given below.

The patient, S. A., aged 17, confluent type of variola (*vide* plate I, figure 1); treatment started on the 7th day after the first appearance of the eruptions.

Date	Subcutaneous injections	Temperature, °F.
18th April	8 c.cm. serum + 2 c.c. vaccine lymph.	104.0
19th April	18 c.cm. of diluted (1 in 10) serum + 2 c.cm. vaccine lymph.	103.0
20th April	Same as on 19th April ..	98.5
21st April	Ditto ..	98.5
22nd April	Ditto ..	98.5

Comment

Recovery was much earlier than could otherwise be expected. Serum alone did not bring down the temperature earlier in some other cases. Patel and Naidu (1940) reported that convalescent serum as well as calf and sheep sera did not significantly reduce the mortality of smallpox cases. The number of cases is so small that a definite conclusion cannot be arrived at. The epidemic subsided before we had collected sufficient convalescent serum and tested all samples for sterility and for the Wassermann reaction, but the results are so encouraging that we hope to continue the work during the next epidemic season.

The rationale of the treatment is the same as in sero-vaccine treatment. Antitoxic and antiviricidal principles present in convalescent variola serum partly neutralize the virus and its toxins that overpower the reticulo-endothelial system of the body. The system thus released is free to act and develop immunity in response to the foreign antigen injected.

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Our thanks are due to the superintendent and Dr. B. C. Chatterjee, the officer in charge of the smallpox ward of the Campbell Hospital, for giving us free scope for conducting our experiments.

REFERENCE

PATEL, T. B., and NAIDU, *Indian Med. Gaz.*, **75**, 730. B. P. B. (1940).

A VERY LARGE OVARIAN TUMOUR

By RAI BAHADUR CHHAGAN NATH

Chief Medical and Public Health Officer, Mewar State, Udaipur

A FEMALE, aged 30 years, was admitted to the Lansdowne Hospital, Udaipur, on the 29th April, 1941, with an abnormally huge abdomen supported on thin and emaciated legs with a typical side-ways gait.

Fig. 1.—Before operation.

History.—The patient was a nullipara with regular menstrual history except for the last year. Three years back she noticed a small swelling in the right iliac region which appeared to be increasing slowly in size till it reached the present dimensions.

Family history.—Nothing special.

Physical examination.—Patient lying on the back was unable to see the lower extremities. Abdominal veins prominent. Fluid thrill present. Abdominal viscera were not palpable owing to marked distension of the abdomen. Heart—displaced upwards with feeble sounds. Costal angle—markedly obtuse. Vaginal walls—protruding, owing to pressure from above.

Dimension of the abdomen before operation.—Circumference at the umbilicus—52 inches. Maximum circumference—58 inches. Distance between ensiform cartilage and symphysis pubis—29 inches. Distance between anterior superior iliac spine and umbilicus on the right side 15 inches, and on the left side 18 inches.

The patient was operated upon on 31st May, 1941, and 25 pounds of fluid and 18 pounds of solid tumour (total 43 pounds) was removed. The patient made an uneventful recovery.

Fig. 2.—After operation.

The interesting feature in the case is that a tumour of such a large size and weight is a rarity.

My thanks are due to Dr. M. H. Hakim and Dr. G. Rudraniamma for help in operating.

A CASE OF RUPTURE OF UTERUS DUE TO HYDROCEPHALUS

By A. CHACKO, W.M.S.

Lady Hardinge Hospital, Akola, Berar, C. P.

A FEMALE, aged 28 years, was admitted into hospital on 15th March, 1941, at 9 p.m. She gave a history of having been in labour for 4 days in a village 10 miles away.

Examination.—General build was good, but she was extremely exhausted and her temperature was 100.4°F. Pulse 120 per minute. Abdominal examination showed classical signs of obstructed labour with a very big head at the lower part of uterus. Fœtal heart sounds very faintly heard. Vaginal examination confirmed the diagnosis of hydrocephalus with a brow presentation. Os was fully dilated and there were signs of infection already. There was no vaginal bleeding.

Treatment.—The head was perforated and the fœtus was extracted without any difficulty. Bleeding started per vaginam and a tear was felt in the left lateral wall of the uterus 3 inches above the cervix, which was intact. The placenta was on the posterior wall and it was manually removed. No intestines were felt through the uterine tear. As the tear was too high for easy packing it was decided to open the abdomen. A tear one and half inches long was found anterior to the left broad ligament. The peritoneum was intact over the tear and there was blood subperitoneally. There was also a big swelling underneath the left broad ligament, which was getting bigger. The rent was sutured with catgut and also stitches were put into the broad ligament after applying pressure, and the bleeding was controlled. Sulphanilamide was applied

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to the peritoneum locally and the abdomen was closed with drainage. The patient had soluseptasine and proseptasine for 7 days with other treatment. The stitches were removed on the 8th day and the wound had healed by first intention except where the drainage tube was inserted, which drained pus. The wound was dressed with sulphanilamide. The first 4 days the patient was very ill. But she gradually recovered and was discharged on the 30th day.

Points of interest

1. Classical treatment of packing for incomplete tear would have turned an incomplete tear into a complete one in this case.

2. Abdominal bleeding was more efficiently controlled and the exact extent of damage was estimated. The drainage per abdomen and per vaginam made the puerperium less difficult to treat.

3. Local use of sulphanilamide gave very satisfactory results.

A CASE OF TRAUMATIC APPENDICITIS

By M. V. BHAJEKAR, M.A., M.B., B.Ch., F.R.C.S.
Sir J. J. Hospital, Bombay

CASES of appendicular disease of all varieties are common enough, and my only justification in reporting the following case, which came under my care as an emergency, is its peculiar history and the current discussion whether trauma can give rise to acute appendicitis. In an editorial in the *Journal of American Medical Association* on 4th June, 1938, it is said that 'the consensus is not only that it can but that the resulting attack is likely to be one of great destructive type, with a clear clinical picture'. The following case corroborates this view :—

A boy, aged 13 years, was admitted into the Sir J. J. Hospital on 21st March, 1941, at 9-30 p.m., complaining that he had been getting severe abdominal pain since 8 p.m. the previous evening.

History.—At 4 p.m. on 20th March while trying to open a door, he fell and was hurt in the right lower part of the abdomen by falling flat on his face on the doorstep. He was quite well till about 7-30 p.m. when he began to feel pain in the abdomen. At first the pain was situated below and to the right of the umbilicus. When he was admitted the pain was generalized all over the abdomen. Since the onset of pain he vomited six times and the bowels had not moved. Also he had not passed urine since the accident. He was catheterized on admission to the hospital but unfortunately the amount of urine was not measured.

There was no history of previous abdominal pain. The child had suffered from roundworms previously and was treated for them. There was no history of appendicitis in the family.

Examination.—The patient looked somewhat ill. The tongue was dry and coated and the pulse rapid—140 per minute. The abdomen was distended and resistant, more particularly in the right iliac fossa, where he was hurt. There was no rigidity anywhere, and shifting dullness was not definite. On auscultation, sounds produced by peristaltic movements were audible and the heart sounds could be heard on abdominal auscultation.

Operation.—The child was prepared for operation and spinal injection of 1 c.cm. stovaine was given.

On palpating the abdomen after administration of the spinal anæsthetic, a lump could be felt on the right side, lateral to and at the level of the umbilicus.

The abdomen was opened through a right para-median para-umbilical incision. Immediately on opening the abdomen thick yellow pus welled out of the wound. As much of it as possible was removed. On further examination a piece of omentum, brownish black in colour, was found adherent to the cæcum and terminal part of the ileum. This part of the omentum was ligatured and severed from the main body of the omental mass, and it was then easily detached from its adherence to the cæcum and terminal part of the ileum. Underneath it an almost gangrenous and kinked appendix was discovered. The meso-appendix was ligated and cut. The appendix itself was then ligated as near its base as possible, cut distal to the ligature and the stump buried into the cæcal lumen by means of a purse-string suture. As much of the pus as possible was removed by means of a suction apparatus. Two large-bore drainage tubes were inserted through separate stab incisions, one in the right flank and one in the supra-pubic region. The abdominal incision was then closed in layers, leaving a small rubber drain in the lower angle of the wound down to the rectus sheath.

Post-operative progress.—The patient kept getting distension for four days after the operation. This was treated by means of a flatus tube in the rectum, injections of acetylcholine and injections of strychnine, atropine and pituitrin. The superficial drainage was removed at the end of 36 hours and the intra-peritoneal drainage tubes at the end of 96 hours.

Sutures were removed on the 10th day, when part of the wound gaped and discharged pus. A light pack was inserted and six-hourly magnesium sulphate fomentations were applied. The patient was discharged on 5th April with the wound almost healed.

On 15th April the wound was completely healed.

Examination of peritoneal discharge on 28th March showed the presence of gram-positive diplococci, gram-negative bacilli; *B. coli* and *Streptococcus fæcalis* in culture.

Histological examination of the appendix showed 'Diffuse acute inflammation of all the coats. Mucous membrane ulcerated at places. The congestion is intense and there is some evidence of gangrene commencing'.

The patient came to report on 14th July and said that he was quite well.

I am indebted to Dr. M. G. Pradhan, for examination of the peritoneal discharge, and to Prof. P. V. Gharpure, for examination of the appendix.

I must thank the superintendent of Sir J. J. Hospital for allowing me to report this case.

A CASE OF HYMEN IMPERFORATA

By M. N. PALADHI, L.M.F.
Lohaghat Dispensary, Almora, Himalayas

A THINLY-BUILT girl, 20 years of age, was brought to me for the treatment of a 'growth' in her lower abdomen. On enquiring into the history, I found that she had felt some sensation in her lower abdomen every month since her 18th year followed by heaviness, which used to persist, resulting in the gradual formation of a mass in the centre of her lower abdomen. The mass now reached 1½ inches above the symphysis pubis. Her breasts were fairly developed. On palpation the mass was felt to be fluctuating. On vaginal examination the hymen was seen to be thick and tough, forming a complete septum without any aperture. On pressure of the abdominal mass, the hymen bulged out.

Operation.—No sooner was the hymen opened by a crucial incision than a gush of thick, tarry blood flowed out. The flow continued till it nearly filled a small bucket and the swelling automatically disappeared. The hymen was then snipped off and a vaginal douche of lysol was given; this was continued for about a week. The girl had her next menstruation as usual and from then on continued a normal life.

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† *Calculated from "Food, Health and Income," Macmillan, London. 1936. J. Soc. Chem. Ind., June, 1937. J. Soc. Chem. Ind., Jan., 1940.*

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Indian Medical Gazette

JANUARY

BLOOD PRESSURE IN THE TROPICS

VARIATIONS in blood pressure occur under physiological conditions, and the range even of the normal is wide; further, the pressure may differ in the two arms of the same individual. When one is asked what is the normal blood pressure of a man of thirty, a suitable reply is 'what is the height of a man of thirty'? Blood pressure varies as much as height, and the various arbitrarily-assumed standards give only a very rough indication at the least. As a matter of fact, the word 'normal' as applied to physiological standards has never been clearly and convincingly defined; in this case, the 'normal' blood pressure signifies no more than the most common pressure in healthy persons of a specified age group, or, in statistical terms, the median of the frequency curve of the pressures in such individuals.

Observations in western countries show that in normal men between 20 and 60 years, the average systolic/diastolic pressures show an increase from 120/80 to 140/90 mm. of mercury. A systolic pressure below 110 in an adult male is usually regarded as hypotension. When a person whose systolic pressure is found to be, let us say, 108 mm. of mercury complains of general tiredness and premature fatigue, it is not unusual to assume that his symptoms are associated with this hypotensive state. On the other hand, a physician, in the course of routine investigation, will often encounter a subject with a maximum systolic pressure not higher than 100, who is nevertheless bursting with health and energy. Although he may perhaps be unfit for high flight, there is no reason to alarm him about his low blood pressure. The evidence that hypotension is a disease has never been convincing.

The average blood pressure rises with age, but this does not mean that rising pressure is normal. The systolic pressure is liable to greater variation; there may be a transitory rise due to various causes such as emotion, pain, exercise, etc., but the diastolic pressure is more stable. The so-called 'essential hypertension', apparently due to increased arteriolar tone, the exact primary cause of which is yet undiscovered, very often gives rise to no symptoms. The high pressure is needed to maintain the normal capillary flow against the resistance. It has a marked familial incidence and usually becomes evident after the age of 40. It is not uncommon in women at the time of the menopause, and is not infrequently associated with obesity. Many hypertensives however lead an active life and enjoy fair health, the condition being perhaps accidentally discovered in the course of routine examination for insurance or some other purpose. On the other hand, there are patients who complain of a variety of symptoms, the combination of which is almost diagnostic of hypertension.

Statistics show that expectation of life shortens as the blood pressure rises above normal. Therefore, a man may usually consider himself fortunate if his blood pressure is found to be lower than his standard.

Authoritative 'normal' standards for people in the tropics have not been worked out, although many recorded observations on the past general experience have led to the accepted view that the systolic, diastolic and to a less degree the pulse pressures are lower than those of Europeans and Americans of corresponding age, weight and height living in their own countries. Thirty-five years ago McCay studied the blood pressure of 500 adult male Bengalis. The instrument used was Riva-Rocci's sphygmomanometer, and the systolic pressure was noted at the disappearance of the pulse in the radial artery, the arm being placed on a level with the heart. All readings were taken with the person in a sitting posture. The pressure varied from 95 to 105 mm. Hg., the average being just under 100, or about 15 to 25 per cent lower than in Europeans in Calcutta. Low pressure has also been recorded in other oriental races, by Musgrave and Sison in the Philippines in 1910 and by Cadbury in China in 1922. A few observers, Siler in 1925 and Roddis and Cooper in 1926, have shown that foreigners living in the tropics tend to develop lower pressure; the latter workers found the blood pressure of 67 naval officers 11.4 mm. Hg. lower than that of a corresponding group of individuals in the U. S. A., and that the pressure gradually rose when these officers returned to their own country.

Thus the fact that blood pressures in normal individuals in tropical countries are maintained at lower levels than in colder climates, is more or less established, but there still seems to be some doubt as to whether race or climate is the more important factor in determining the 'normal' blood pressure.

McCay considered that the climate was not the chief cause, because Europeans living in the hot moist atmosphere of Calcutta did not show the low pressure. As the capacity for muscular work in Europeans is superior, he assumed that musculature was superior in the voluntary as well as the involuntary groups. Other workers who have demonstrated the lowering of blood pressure after temporary residence in the tropics claim that climate has a definite effect on blood pressure; this is reduced in the tropics, because the vasomotor tone is at a lower level than in more invigorating climates. Musgrave and Sison thought that the diminution was due to a lower peripheral resistance, associated with cutaneous vaso-dilatation and increased secretory activity of the sweat glands. Incidentally,

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it would be interesting to know whether the blood pressures of inhabitants of the tropical zone undergo any change when they live for some time in the temperate zone.

The influence of the cardiac output, elasticity of arterial walls and viscosity of blood have been eliminated as causes of this lower level of blood pressure in normal subjects, but the factors in its causation are probably manifold. These are climate, race, heredity, height, weight, activity, temperament, and diet. Small stature, light weight, simplicity of life, less 'civilization' with perhaps less nervous strain, and a diet largely vegetable and low in animal protein, are common features among the indigenous population of the tropics, many of whom also observe fasting from time to time. If a more detailed study of blood pressure in relation to diet were made, it is possible that some important data would be obtained.

Hypertensive readings are frequently encountered in England and America, where four meals are usually taken daily and there is a preponderance of animal proteins in the diet. Such a diet is liable to give rise to pressor amines or other metabolites in the system, which act as additional factors in keeping up the blood pressure. In this country, similar readings are apparently not uncommon among the Indians whose feeding habits are similar to those of Europeans, but hypertension is said to be rare in the hard-working villager, whose means will not allow more than two substantial meals a day, and those mostly of carbohydrates.

We are including in this issue a paper based on the blood pressure readings in 10,000 persons, mostly Indians, living in India. These observations show that the average systolic pressure of Indians is from 4 to 14 mm. Hg. and the average diastolic pressure is from 6 to 10 mm. Hg. lower than that of Americans and Europeans of the corresponding age groups, the difference in both cases being greater in the lower age groups. It was also found that the systolic blood pressures were slightly lower amongst the people of Bengal and Madras than amongst those of northern India; a similar difference between vegetarians and people living on a mixed diet was also noticed, but in neither case was there the same difference in the diastolic pressures.

The large number of observations and the constancy of the difference between the pressures of Indians and Europeans put this particular question beyond any possible doubt. It is a pity that the blood pressure data for Europeans living in India, which must be available, cannot be similarly collected and analysed.

Special Article

MINOR DRUG HABITS OF INDIA

By SIR R. N. CHOPRA, C.I.E., M.A., M.D., SC.D. (Cantab.), F.R.C.P. (Lond.)
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CAPTAIN, A.I.R.O.

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PART I

Historical and general.—The idea of stimulating or 'whipping up' the physical and mental powers of individuals undergoing especially laborious efforts is not a new one. Even in ancient days it was known that certain substances could give the tired and exhausted individuals added strength. These stimulant substances have been commonly called 'dopes'. The term 'doping' in a wider sense means stimulating the body activity, removing the sense of fatigue, as a temporary measure, after physical and mental performance, by taking certain substances, whether food or drugs, whenever it is considered necessary. Samoyed tribes of Mongolia and Siberia, for example, ate fly agaric (*Amanita muscaria*), a mushroom containing muscarine, to rouse themselves to the required pitch of combativeness. The celebrated Berserkers, an ancient class of wild Norwegian warriors, are also said to have used certain agents in order to gather the necessary rage or frenzy in a battle. They howled like wolves or growled like bears, bit their shields and foamed at the mouth and were believed to possess enormous strength which rendered them invulnerable. The red Indians used to chew coca leaves when a particularly strenuous or protracted effort was required of them. The administration of stimulants to animals taking part in certain sports became so common that in some countries legislation had to be introduced to forbid their use on the ground of cruelty to these animals. The practice of doping race and hackney carriage horses, although not common, still exists in India. In these days of stress and worry the conditions of life are becoming daily more and more difficult, and hard-worked people are more prone to the practice of 'doping' themselves to increase their physical and mental output. Consequently the number of 'dopes' used has increased considerably during recent years. It may even be said that at the present time these substances play an important part in the economic life of nations. Some of these have assumed considerable importance because to millions of people they have become indispensable necessities of life. These 'dopes' consist of substances which either act as readily assimilable foods or merely as stimulants to the nervous system. In this paper we have not

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touched on the moral or ethical aspects of this problem, but have made an attempt to explain the effects of common 'dopes' used in India and the effects they are likely to produce on the health of the individuals who use them. We have considered these as a class of minor drug habit.

Physiology and modes of action of 'dopes'.—There are many methods of increasing the efficiency of mental and physical performance, the first and the most common being the use of drugs. Secondly by means of concentrated foods, such as sugars, salts, vitamins, etc., which are utilized by the body, particularly during muscular effort. Thirdly by means of substances which can be used as food accessories. And lastly there are certain physical means that can increase the efficiency for work, for example, massage, baths, sunlight, application of cold to the head, etc.

Certain characteristics distinguish substances belonging to the group of 'dopes' from drugs of addiction. Firstly 'dopes' may or may not be used habitually and in increasing doses as is the case with drugs of addiction. They do not affect the system of the individual in such a way as to produce an intense craving and they do not produce marked abstinence symptoms if the dose is not forthcoming. Secondly 'dopes' may not only be drugs but foods, such as, sugars, eggs, substances that are rich in phosphorus, calcium and vitamins. When employed for this purpose, their action generally extends to the brain and particularly to the cerebral cortex. The effect is largely excitation or stimulation, and even if it is highly concentrated and intense, it is produced without bringing into evidence serious symptoms of fatigue or inhibition of certain body functions as is usual in the case of drug addiction. With 'dopes' the mental functions are maintained at their initial level for a longer period than usual, in spite of the natural tendency to fatigue which is the result of labour continued intensely for some time. The sensory activity of the brain is also augmented by the use of some of these substances and this results in a more vivid perception of mental impressions. The will finds the central nervous system more responsive to its orders even with respect to physical exertion and muscular activity. This, however, is not subjectively felt as a constraint produced by the drug.

Another point which distinguishes the 'dopes' from the drugs of addiction and narcotics is that the consciousness of the individual is not diminished, and physical and mental work may be carried out without impairment. This is not the case with the group of narcotic drugs to which belong the majority of drugs causing addiction and which by repeated use damage the functions of the central nervous system. Another interesting feature with regard to 'dopes' is that in this class are included certain substances which also exercise stimulating or depressant effects on organs other than the central nervous system, *e.g.*, circulatory, respiratory, etc.

Group I. Drugs used as 'dopes'

Drugs which are used as 'dopes' can be grouped under four headings :—

1. Class 'A' consists of substances which act through the central nervous system. They may be stimulants or sedatives.
2. Class 'B' is composed of those drugs which act through the cardiovascular system and which may further be divided into stimulants and depressants.
3. In class 'C' are included hormone preparations which act through the endocrine system.
4. In class 'D' are included metallic preparations such as arsenic and mercury.

'A' drugs acting through the central nervous system

Stimulants.—The common stimulating drugs used as 'dopes' are alcohol, ether, smelling salts, benzedrine, caffeine and strychnine.

1. *Alcohol.*—The intoxicating effects of alcohol are so important that its other properties, such as its being a source of energy and a ready food, merge into insignificance. Alcohol is very rarely used by labourers and athletes in these days, to increase their output of work. On the other hand it is realized that when taken in large quantities it lowers the standard of work. Alcohol only acts beneficially when it is given in a dilute form, in small doses, and at appropriate times. It acts as a stimulant by removing inhibitions and by lesssening the sense of fatigue. In the case of very prolonged exertion, such as occurs in workers in mines, the practice of taking a glass of country beer or a dose of country spirit as a stimulant is quite common. Another very common use of alcohol (in a very dilute form) in the form of a 'dope' is prevalent in the hill tracts of India and amongst the aboriginal tribes. Country beers are taken in certain parts of India and there is evidence of their use as far west as Poona, and as far south as Canara and Mysore. In the mountainous regions of India where economic conditions are poor, and the natural craving for a stimulant is greater on account of climatic conditions, the use of varieties of beers and spirits, offered at prices commensurate with the means of the people, has been in vogue for centuries. Such drinks are generally taken in order to tide over the feeling of exhaustion after a day's hard labour in the fields, in the tea gardens or during the trying winter season. They are used by practically all the male and female workers in the coal-mining districts of Bengal and Bihar, who indulge in such drinks after finishing their monotonous and wearisome work, which involves considerable physical strain. The quantities taken are often moderate, just sufficient to relieve the feeling of fatigue and ensure sound sleep. We have been informed by men working in these areas that their work is so hard, uninteresting and tiresome that it would be impossible for them to get through it every day if they did not take these beverages. In fact, many become so used to them that they are unable to work if they do not get them, and the mere prospect of getting a drink is very often an incentive for work. Besides their action on the central nervous system, many of these alcoholic beverages have considerable food value. During the process of fermentation many indigestible carbohydrates are converted into more readily assimilable sugars. The nutritive value of rice beers, such as *Pachwai, Zu,* and others, is undoubtedly substantial and they are rich in vitamins. The Nagas, who have fine physique, never drink milk or use it as food; they always drink *Zu* prepared in their own homes.

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Medicated wines.—During recent years the use of certain medicated wines and proprietary preparations which do not disclose the fact that they contain alcohol has increased in this country. Many people delude themselves with the idea that when a wine is medicated it is free from the harmful effects of alcohol. The common preparations used in this country are Vibrona, Hall's wine, Vermouth, Drakshamalt, Vinomalt, etc. Instances of their habitual use are known among the female members of respectable families who take such preparations, quite ignorant of the fact that it is the alcohol which gives them the sense of euphoria and well-being.

Discussion.—To understand the use of alcohol as a 'dope', it is necessary briefly to review the results of experiments carried out by various workers in order to determine the effects of alcohol on the performance of different kinds of work. Hellsteen using an ergometer of the Johannson type showed that the administration of 80 grammes of alcohol half an hour before the work was started diminished the total output. On the other hand, small doses of alcohol taken five or ten minutes before the beginning of the work increased the output during the first part of the test but reduced it in the later stages. Other workers have found that a certain dose of alcohol in higher concentrations reduces the quantity of work much more than when it is given in a diluted form. The time of administration is also important. Atzler and Meter have carried out interesting experiments in this connection. They determined the effect of large doses of alcohol (240 c.cm. in beer or brandy) on muscular work in a habitual drunkard. The work was continued to the point of exhaustion on the cycle ergometer. It was found that both the intensity and the total output of work were reduced if alcohol was given on the evening before the test. But if it was taken a few hours before and the work was hard, the aggregate output was slightly increased. When given just before the test, the zeal for the work was enhanced although it was irregular. These authors believe that the immediate effect of alcohol is the production of a feeling of euphoria and happy mood. Our own experience after studying a large series of cases is that alcohol certainly reduces the output of muscular work, especially when it is of a delicate and skilful nature and requires fine co-ordination. If the work is rough, small quantities generally enhance the output. With large doses and with higher concentrations the effects are always detrimental. With small doses and in a dilute form it may produce no appreciable results.

With moderate doses the inhibitory effects of alcohol on the sense of fatigue and the exhausted nerves may often help the individual to perform more work. In physical exertion where only rough muscular effort is required, small doses of alcohol in a dilute form may, to a certain extent, increase the total output of work. But where a finer quality of work is required even small doses may be harmful.

From what has been said above, it transpires that the practice of total prohibition may not be altogether beneficial, as alcohol in small doses, in those who have to undergo hard work and physical strain, causes a feeling of well-being and inclination for work. It has, however, toxic properties and its use in connection with prolonged muscular and mental work should not be encouraged.

2. *Ether.*—Ether is not used in this country for euphoric purposes and as a 'dope', although instances of such use have been recorded in the west. It is usually taken in the form of 'Hoffmann's drops' which consists of one part of ether and three parts of alcohol. During the last war it is alleged that it was sometimes drunk by Germans before an attack to produce exhilaration and disregard of danger.

3. *Smelling salts.*—Smelling salts are particularly used by clerks and persons who are engaged in sedentary occupations. The practice is prevalent in large towns of the Bengal, Bombay and Madras Presidencies. The mixture used in this country consists of a solution of ammonia or ammonium carbonate combined in most cases with ethereal oils. The smelling salts reflexly affect the central nervous system by exciting the nasal mucous membrane and in this way produce general stimulant effects. The use of smelling salts is not likely to do any severe harm but when indulged in to excess the practice is likely to produce rhinitis and sometimes sinusitis and headache. It has been observed that prolonged use of these salts leads to a craving for their use.

4. *Snuffs.*—Dried powdered tobacco leaf was first used for stuffing into the nose in Portugal in the middle of the sixteenth century and its use spread to France in the reign of Catherine de Medici. It was believed to be a remedy for colds and headache and was also employed against diseases, real or imaginary, and as an excitant for the nerves. The habit of taking snuff rapidly spread in Europe and from there to other parts of the world. Snuff has been extensively used in Africa where it is frequently mixed with alkaline charcoal or an alkaline sodium salt which probably helps in liberating the alkaloid nicotine. Concentrated extracts of tobacco are also inhaled through the nose. There are many indigenous preparations used in this country for exciting a stimulatory reflex from the nasal mucous membrane. The common ingredients of these snuffs are powdered leaves of tobacco, saffron, powdered chillies, lime, flower of *Kaner* plant, etc. The snuffs are used by the middle and lower classes.

5. *Cocaine.*—In form of coca leaf this alkaloid is one of the oldest and commonest 'dopes' used in South America, but it was introduced into India about fifty years ago. Elsewhere the present authors (Chopra and Chopra, 1931) have shown that there are between thirty to forty thousand cocaine-eaters in this country. The habit of eating cocaine prevails amongst the artisan class in many of the large towns of India, such as, Calcutta, Karachi, Bombay, Delhi, Allahabad, Benares, and others. The drug is consumed in betel leaf, especially late in the evening. The effect of cocaine is chiefly upon the central nervous system, which constitutes the motive for its use as a stimulant and later, perhaps, as an inhibitory agent. The mental exhilaration or euphoria soon becomes apparent and there is also loss of sense of fatigue. These properties, in conjunction with its anæsthetic action upon the mucous membrane of the stomach, enable the individual to work for prolonged periods without feeling pangs of hunger or sensation of fatigue. Cocaine does not inhibit

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the metabolic processes of the body at rest. The habit-forming tendencies of this alkaloid and its other effects have been fully discussed by the present authors elsewhere (Chopra and Chopra, 1931). When the drug is taken during physical or mental exertion, it removes the sensation of fatigue, thus indirectly raising the level of performance in the course of a prolonged effort. This inhibition of the sensation of fatigue, which is the normal safety-valve, is not without its dangers. Even occasional use of this drug might be attended with harmful effects. The people of India appear to suffer more than Indians of South America, and the baneful effects on their health are apparent comparatively earlier and are more potent than with any other drug.

A certain amount of experimental work on the action of cocaine on muscular work has been carried out. It has been shown that the capacity of the subjects for work was much higher after taking 0.1 gm. of cocaine than without it. Large doses gave rise to a feeling of fatigue and disinclination for work. More recent work on metabolism during physical exertion has shown that the output of work is enhanced and the efficiency increased after administration of small doses of this alkaloid. The effects, however, are only temporary. From these experiments it should not be inferred that cocaine is a useful drug for overcoming fatigue and removing depression. It has been shown by the present authors, in Indian subjects, that its use is attended with harmful mental and physical effects, which are more pronounced and set in more rapidly than in the case of any of the other 'dopes'.

6. *Benzedrine (Beta-aminopropylbenzene).*—Benzedrine sulphate is a harmful stimulating agent which has a distinct effect upon the vegetative nervous system and particularly on the pulse rate and blood pressure. Individuals who do not take this drug habitually may get a rise of blood pressure (both systolic and diastolic) of 10 to 30 mm. of mercury which may persist for several hours. In those habituated to its use these changes are not marked. A few instances of the frequent use of benzedrine have been brought to our notice amongst the members of the medical and allied professions in this country. We know of one instance where the drug was taken regularly by a doctor before going to his consulting-room. Fortunately, its use has not spread amongst the public in general.

The principal beneficial effects are due to its psychic action which is frequently dramatic. Subjectively, there is a change of mood which tends to produce a feeling of euphoria. The individual has a feeling of increased self-confidence, initiative and mental poise; depression is lessened; the processes of thought are accelerated. Immediately after taking the drug there is a sense of increased energy and capacity for work, feeling of exhilaration and a sense of well-being. In some cases there is an increase in the mental activity and general efficiency; there may be a tendency to loquaciousness. This drug has been recommended for diurnal drowsiness and also for certain emotional stresses. Stimulation of the cerebral centres produces insomnia and restlessness. Sargant and Blackburn (1936) have shown an improvement of intelligence by test scores, and Bradley (1937) observed better performance in children with behaviour disorders. Nathanson (1937) tried the drug in patients who suffered from exhaustion. Beta-aminopropylbenzene sulphate was administered to forty individuals, most of whom did not suffer from any organic disease, and who could be diagnosed as suffering from nervous exhaustion. Focal infection was present in some instances and in other cases the condition followed an infective process. The drug was administered in the form of tablets containing 10 milligrammes, and the majority of them received a daily dose of 20 mgm., one tablet before breakfast and another before the mid-day meal. In patients in whom fatigue was most evident late in the day a single dose of 10 or 20 mgm. was given about 11 o'clock in the morning. The drug was used for periods varying from one week to three months, and with a few exceptions striking physical and mental reactions were observed. There was marked amelioration of symptoms of fatigue, and sluggishness was completely overcome; migraine was also cured in a few cases; sense of increased energy and capacity for work was noticed in more than half the cases; there was also increased mental activity and efficiency.

The effects of prolonged use of this drug so far investigated, are loss of appetite along with increased physical activity, which may lead to a reduction in body-weight. Dryness of the mouth, disturbed sleep, transitory tremors of hands, sweating and palpitation are also sometimes observed. It would thus appear that Beta-aminopropylbenzene (benzedrine) exerts a definite stimulating effect on the higher centres in the central nervous system in most cases. There are, however, considerable variations in the intensity of the response.

In patients who become easily fatigued or who are in a chronic state of exhaustion, this drug has a favourable effect. It should, however, be realized that the effects of benzedrine are purely symptomatic and the drug should only be used when all physical causes of fatigue have been considered and eliminated. It is useful in types of fatigue such as those due to nervous exhaustion, and symptomatic relief in such patients appears to have a decidedly beneficial effect. It is also important to consider in this connection the question of possible harmful effects, including the possibility of habit formation and development of tolerance. The euphoric effects are lessened on continuous administration, but many patients find them sufficiently desirable to continue its use for many months. No instance of true addiction has come to our notice in this country though many authors have given warnings of this possibility.

Many individuals are unable to take benzedrine, as even small doses (5 mg.) produce extreme nervousness, palpitation, vertigo, and excitement which have been described by one patient as 'going crazy'.

7. *Caffeine.*—Although caffeine in the form of tea and coffee is one of the common doping agents used in India, its use in alkaloid form is not seen. The uses of tea and coffee have been discussed in another section.

Caffeine is of value as a stimulant in certain depressed and debilitated individuals. The depression experienced on awakening after the use of hypnotic drugs, over-indulgence in alcoholic drinks or the low spirits of patients with a depressive psychosis are sometimes alleviated on administration of two or three grains of caffeine citrate. Caffeine is also of some use for the prevention of dizziness, disturbances of consciousness, or convulsive attacks of cerebral arteriosclerosis. In clinical experience, caffeine caused little, if any, elevation of blood pressure and is not contra-indicated in hyperpiesis. In doses of 5 to 7½ grains, caffeine citrate is used for relief of the fatiguing type of headache and also for the alleviation of some cases of migraine. Caffeine has a stimulating effect on the centres of the spinal cord, exactly similar to but not as pronounced as that of strychnine.

8. *Strychnine.*—Strychnine as a 'dope' is not commonly used in this country.

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Sedatives.—The sedative doping agents include opium, barbiturates, chloral hydrate, paraldehyde, coal tar derivatives, aspirin, bromides and valerian.

1. *Opium and its alkaloids.*—Elsewhere, we have exhaustively dealt with the opium habit in India from its various aspects. We have pointed out that there are a large number of individuals in this country who take small doses of opium occasionally, to get them through periods of strain and stress. They do not take the drug habitually but only at certain times in small doses. We have quoted examples of many persons in the Punjab who take ½ to 1 grain of opium, generally during the winter months with the idea that it protects them from coughs and colds. They give it up as soon as milder weather sets in. Then again there are others who take small doses of opium to enable them to cope with the strenuous work of the harvest. In such individuals opium is not a drug of addiction, but is merely a 'dope'.

2. *Barbiturates.*—Barbituric acid and its derivatives are widely used nowadays and have become a source of danger to the people in this country. Instances of their abuse are at present confined to large cities. They are excellent hypnotics and often help in procuring sleep to persons in states of anxiety, worry, and exhaustion, and also when individuals feel nervous and excited before undertaking some hazardous task. Shock due to breavement, loss in business or maladjustment of domestic affairs may induce an individual under the advice of a doctor, and sometimes independently, to take one of these drugs to allay uneasiness of mind. Preparations containing barbituric acid and hyoscyamus are known to have been used in sailing contests to prevent sea-sickness.

The present authors (Chopra and Chopra, 1935) found that although various members of this series were occasionally used to overcome the sense of mental fatigue and exhaustion, and also to combat the sense of depression and insomnia after withdrawal of drugs such as opium or alcohol, habit formation did sometimes occur after such use. Our inquiries show that certain drugs of this series are used by young licentious individuals and prostitutes for sex gratification. Persons with unstable nervous systems under worry and stress are more prone to use them, as some of the barbiturates decrease inhibitions to some extent. This is why their use is dangerous. The individual, in order to produce sound sleep at bedtime, takes a dose and feels the soothing effects and a feeling of euphoria; in order to enhance its effects he may repeat the dose. This removes inhibition, and also impairs judgment, which in turn leads to excessive indulgence or overdose which has resulted in unconsciousness and even death. It is, therefore, dangerous to use these drugs, and they should not be sold to the general public save on a prescription by a qualified physician; the dose should not be repeated except under the express order of a qualified doctor. The abstinence symptoms in the case of barbiturates are very mild, so that they can be suddenly stopped without much difficulty. They undoubtedly have bad side-effects.

2. *Chloral and paraldehyde.*—During recent years the use of chloral hydrate as a drug to induce a sense of well-being and to reduce fatigue has been reported in certain parts of India. The present authors (Chopra and Chopra, 1932) reported a number of cases where the drug was mixed with tea or dissolved in water or a little alcohol and was habitually taken. The fact that it is cheap and easily available is responsible for the rapid spread of this habit in certain localities. The present authors have shown that the repeated use of these drugs is harmful and dangerous. Mental, moral and physical degeneration sets in earlier and is more pronounced than in the case of other drugs. We saw quite a number of cases where these drugs were taken in toxic doses by individuals on their own initiative and this led to fatal poisoning in a few instances. The symptoms of acute poisoning, as observed in our series, were prolonged and profound sleep with gradual failure of circulation. Continued administration as either a sedative or hypnotic is dangerous as personality changes may occur, as well as loss of appetite, dyspepsia, muscular weakness and tremors. Addiction is easily produced and its results are serious, frequently ending fatally in three or four hours. In habitual users, chronic poisoning occurs which leads to flushing of the face, the conjunctiva becomes yellow and there may be a sense of nervous apprehension. Gastro-intestinal disturbances, shown by thickly coated tongue, anorexia, epigastric pain, pain in the hepatic region, and diarrhœa are common effects. Others complained of a feeling of intense cold and faintness. The urinary changes were also frequent; the dark colour of the urine due to hæmtoporphyrin is characteristic. Skin eruptions were also seen, they consisted of an itchy sensation and a papular rash all over the body. The sexual impulse becomes sluggish and may be followed by impotence. There may be palpitation of the heart and respiratory distress on slight exertion. If the use is not given up, the individual suffers from general cachexia and dies of exhaustion.

3. *Aromatic analgesics.*—A number of phenol derivatives are commonly used for reducing temperature, relieving headache, muscular pains, etc. Aspirin is the most popular, and thousands of tons of this drug are consumed annually. It has largely replaced phenacetin and antipyrin which were commonly used in this country two decades ago in combination with caffeine. Aspirin and cinchophen are now extensively used, chiefly the former.

Analgesic phenol derivatives reduce the perception of pain only in mild conditions; they have little action in relieving severe pain from wounds or from acute inflammation, though they certainly decrease its intensity and make it more bearable. Aspirin and coal tar derivatives are common dopes used in this country. These drugs are frequently employed by individuals who feel fatigued and yet wish to continue their work. Aspirin is usually taken in doses of 10 grains a day and it is generally mixed with a little caffeine. Various members of this series are used by the laity in Europe and America as a morning 'pick-me-up' and are freely obtainable in soda fountains as effervescent nostrums for aches and pains of all descriptions. As regards the harmful effects, their prolonged use may lead to palpitation, sweating and asthenia.

4. *Bromides and valerian.*—The practice of taking bromides habitually or occasionally is rare in India, and only a few instances of their abuse have been reported to us. Most of the

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individuals who abused these drugs were old patients and here the responsibility lay on the shoulders of the doctors in charge. Moreover bromides are a common constituent of the 'patent medicines' which the neurotic, the sleepless, the depressed and persons with unstable nervous systems take so frequently.

Bromides produce a general depression of the central nervous system. Small doses affect the highest centres in the brain, the subject becoming dull and apathetic. Larger doses increase this depression and depress certain reflexes, *e.g.*, vomiting. General sensation is little affected and they have feeble hypnotic action. On account of war conditions bromides have become expensive. Formerly, on account of their cheapness and easy availability, over-worked and excited persons who suffered from sleeplessness made use of bromides frequently.

According to Tod and Stalker most of the patients on admission to the Royal Edinburgh Hospital for mental disorders were in a toxic physical state and showed mental symptoms of a toxic kind in addition to those of the original disease; the blood often contained bromide, and the toxic symptoms disappeared when the drug was withheld. Not infrequently in the case of patients who are receiving bromides, anxiety, depression, agitation, excitement and other such symptoms become worse. A diet poor in common salt favours the retention of bromides in the system, and the impairment of the function of the kidneys also predisposes to intoxication. The clinical features of bromide intoxication are essentially those of an organic reaction type (acute or chronic, mild or severe); that is, impairment of comprehension, interference with the elaboration of impressions, defects in orientation and retention, dulling of memory, marked fluctuation in the level of attention and emotional process and even acute delirium. Typical nervous symptoms may also be present.

Discussion.—How far the substances exerting a calming influence on the nerves, such as valerian, bromides and drugs containing barbituric acid can be included among 'doping' agents is a question which requires discussion. Nervous disturbances of the heart, such as tachycardia caused by 'nervous' and functional disturbances of the gastro-intestinal tract, are frequent among athletes and workers employed in hazardous jobs, who have to undergo a lot of physical strain. The removal of these distressing nervous disturbances no doubt enables to a certain extent a higher standard of performance to be reached. These drugs should not be considered as true 'stimulants' or dopes as they are used by persons who are not perfectly healthy to allay certain symptoms from which they suffer. They are seldom used by labourers and individuals undergoing hard physical strain as they are likely to cause fatigue by themselves.

Class 'B' drugs acting on the cardiovascular system

(*a*) *Circulatory depressants*

Nitroglycerine, trinitrini, etc.—Although such drugs are known to have been used by persons competing in bicycle races in the west, they are seldom used in this country.

The present authors quite recently saw a case where nitroglycerine capsules were used for the spasm of the coronary vessels, with pain in the cardiac region and high blood pressure, by a man sixty years of age. The capsules were gradually replaced by 0.5 mgm. tablets of trinitrini (one *t.d.s.*) which were continued for several weeks. When an attempt was made to withdraw the drug, the patient complained of pain in the chest and a sinking sensation; bromides, barbiturates and even morphine did not relieve him. The patient continued the drug and felt so miserable without it that he gradually increased the dose to 60 tablets in a week. Such doses continued for three weeks produced unpleasant secondary effects such as vertigo, headache, palpitation, cardiac asthma and fall of blood pressure; and eventually the patient died of circulatory collapse. This is an interesting case in which the drug no doubt relieved the feeling of distress produced by physical strain on a hypertrophied heart, but gradually led to circulatory failure, although there was a certain degree of relief during the early stages.

(*b*) *Cardiac stimulants*

The most commonly used drugs are camphor, cardiazol, coramine, veritol and streptol.

1. *Camphor.*—The use of camphor is frequent in this country. Camphor is one of the essential oils which exercises a powerful stimulating effect on the central nervous system. Camphor is also sometimes used as an ingredient in betel morsel, and is sometimes taken in the form of a pill. It is one of the common ingredients of stimulating confections or other such preparations of *Unani* and *Ayurvedic* medicines. It is supposed to be an agreeable cerebral excitant and is a common household remedy for fevers, cholera, dysentery, dyspepsia and colic. With doses varying from ¼ to 2 grains the symptoms described are a pleasant aromatic smell in the mouth, feeling of warmth all over the body, and a sense of general excitement of a minor degree. Some persons become more alert and exhibit a desire for action, and there may be a rapid flow of ideas. In large doses the drug may lead to a state of intoxication and even unconsciousness.

2. *Cardiazol and coramine.*—Although they are derivatives of camphor, cardiazol and coramine are not much used in this country as dopes.

Recent pharmacological studies have shown that these drugs alleviate the sense of fatigue. They are known to have been used by athletes in other countries as stimulants and tonics. The action of cardiazol and coramine consists chiefly of stimulating effects on the cardiovascular and the central nervous systems, giving rise to a sense of well-being and happiness in exhausted individuals. They increase reflex mechanisms and stimulate the respiratory centre. Administration of large doses may give rise to muscular spasms. Their action on the circulatory system is chiefly due to stimulation of the vaso-motor and respiratory centres.

Various European workers have studied the effects of these drugs on athletes, during violent physical exercise. It has been found that after administration of the drug the pulse rate and blood pressure rise less after exertion and return to normal more readily than otherwise. The output of work is greater and symptoms of fatigue are less marked. Thus it appears that coramine and cardiazol stimulate muscular effort and relieve fatigue. No harmful effects have been so far recorded after their use in therapeutic doses.

3. *Ephedrine.*—Ephedrine in small doses acts beneficially in individuals who suffer from low blood pressure, slow pulse and slight asthenia. Such cases are quite common in the tropics, and this condition may be a premonition of epidemic dropsy. The authors have come across a few instances where tablets of ephedrine hydrochloride were habitually taken. In the case of a young man of 33 who was suffering from chronic fibroid phthisis it had been used for over 13 years. He suffered from bradycardia and as soon as the drug was withdrawn the pulse

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became feeble, and there was a sinking sensation and disinclination for exertion.

Class 'C' drugs of endocrine origin

The most commonly used endocrine preparations in this country are the thyroid extract, suprarenal extract, insulin, testicular and ovarian preparations.

1. *Thyroid preparations.*—The authors have found a few instances in women where this drug was being habitually used for the purpose of securing slim figures and this had very serious results in some instances. The subjects were between thirty to fifty years of age and highly neurotic. The accelerated metabolism and heightened nervous irritability produced by thyroid may overcome fatigue and produce a feeling of increased efficiency, welcomed by many debilitated individuals. Patients with a mild depression, not bad enough to interfere with the pursuit of their occupation, may be sufficiently stimulated by thyroid extract to enable them to carry on their work.

Small doses of thyroid will often cause an increase in physical vigour and mental activity, but thyroid should not be used for this purpose except for very short periods. It should also be remembered that thyroid administration causes an increased excretion of calcium and magnesium and may thus produce a negative calcium balance. Instances of habitual use of thyroid are occasionally encountered, and while easily recognized, if the symptoms are pronounced, they may escape detection when the complaints are mainly excitability, lack of stamina, and an increased tendency to fatigue. The use of this drug, except under strict medical supervision, may lead to disastrous results.

2. *Suprarenal extract.*—Intravenous injections of suprarenal cortex hormone have been recommended by Leyton (1933) for the treatment of debilitated individuals with low temperature, low blood sugar, and hypotension. We have had no personal experience of this preparation either as a tonic or as a 'dope', but have never observed any benefit resulting from the use of suprarenal gland substance by mouth. Eagle, Britton and Kline (1932) reported improvement in muscular work in case of healthy dogs which were given intraperitoneal injections of sterile protein-free extract of adrenal cortex. The more recent work of Missiuro, Dill and Edwards (1938) on adreno-cortical hormone shows that there is an improvement in efficiency, in easy walking tests after the administration of this drug. Instances of habitual or repeated use of preparations of this gland are sometimes encountered in individuals who feel tired and exhausted if they do not take this drug. Asthmatics also have been known to indulge in it habitually, but the effect mostly is psychical.

4. *Sex hormones.*—Sometimes middle-aged women during the climacteric suffer from vague symptoms such as flushes, pains in legs, high blood pressure, disinclination for mental and physical exertion, etc. In such cases ovarian hormones can be administered with beneficial results. These preparations certainly improve general health and produce mental tranquility. We have known instances where maintenance doses of such preparations as *progynon* have not only made the patient comfortable by reducing symptoms of vasomotor disturbances, such as, irritability, etc., but changed their outlook entirely for the better.

In Europe, in certain cases of women athletes, the administration of sex hormone is said to have raised the level of performance. The administration of œstrus-producing substances delayed the onset of menstruation when it coincided with the date of the contest. It is well-known that the desire for activity is greatly reduced in women during the menstruation period. Therefore an attempt was made by Okamoto and his collaborators to retard the menstrual process by means of a follicular product called 'Pelanin' in women athletes. In fifty per cent of the cases they found that 'Pelanin' administered *per os* could retard menstruation. These effects were more marked in the case of young women, but in older ones the effects were not so remarkable. When severe exertion or a contest is to be undertaken by a woman, the hormone treatment must be applied immediately before the day on which menstruation is expected to begin. Although administration of these hormones is likely to improve performance in some cases, these preparations should be avoided, as no one knows their ultimate effects.

It is often believed that the administration of male glandular hormones improves the mental and physical condition in men. These products, however, are still in the experimental stage and no immediate effects should be expected from their use.

Class 'D' metallic preparations

There are two drugs belonging to this group which are used in India as stimulants and as general tonics, *viz*, arsenic and mercury.

Arsenic.—In India, there are many persons who take arsenic habitually. It is sometimes given to horses to give them more energy, sharpen their appetite and to improve their appearance by improving their coat; this practice is very uncommon nowadays. The present authors, during their work on drug addiction, came across arsenic eaters in Northern India. The reason for its habitual use in some cases was curiosity, to feel the effects of a poison; others took it as a tonic and as a purifier of the blood; still others for its beneficial effect in skin diseases, to improve the complexion, as a preventive against tuberculosis, as a prophylactic against certain infectious diseases, to sharpen appetite, and as an aphrodisiac. The usual dose was 0.05 to 0.1 grain a day. The drug is generally taken mixed with butter or in sugar. Arsenic, unlike narcotics, does not give rise to euphoria or pleasant sensations and thus does not lead to any marked craving. Its use is continued simply because prolonged indulgence in it gives rise to a certain amount of habituation and also because of the belief that it improves the general constitution and health. The continued use of arsenic may give rise to poisoning which consists in disturbance of the gastro-intestinal tract and the nervous system, skin eruptions, neuritis and sometimes amblyopia and garlic-like smell from the mouth. In cases of long duration, abstinence symptoms are also occasionally met with. These in severe cases consist of epigastric pain, diarrhœa, sense of fatigue, disinclination for work and sometimes even collapse.

Mercury.—We have met instances of the habitual use of mercurial salts in the form of indigenous preparations in this country. The most common drugs used are *shingraf* and

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makaradhwaja. Mercury is believed to be an excellent sexual and general tonic and is sometimes habitually taken mixed with honey, or butter for such purposes. The senior author (1933) and Chopra and Mukerji (1932) have discussed fully the tonic effects of mercury when taken in the form of soluble preparations, such as *makaradhwaja*, and suggested that the minute quantities absorbed might produce stimulating effects.

REFERENCES

Bradley, C. (1937) .. *Amer. J. Psychol.*, **94**, 577.
Chopra, R. N. (1933) .. *Indigenous Drugs of India*. p. 414. Art Press, Calcutta.
Chopra, R. N., and Chopra, G. S. (1931). *Indian J. Med. Res.*, **18**, 1013.
Idem (1932). *Indian Med. Gaz.*, **67**, 481.
Idem (1935). *Ibid.*, **70**, 188.
Chopra, R. N., and Mukerji, B. (1932). *Ibid.*, **67**, 448.
Eagle, E., Britton, S. W., and Kline, R. (1932). *Amer. J. Physiol.*, **102**, 707.
Leyton, O. (1933) .. *Practitioner*, **130**, 466.
Missiuro, V., Dill, D. B., and Edwards, H. T. (1938). *Amer. J. Physiol.*, **121**, 549.
Nathanson, M. H. (1937). *J. Amer. Med. Assoc.*, **108**, 528.
Sargant, W., and Blackburn, J. M. (1936). *Lancet, ii*, 1385.

(Part II will appear in our next issue)

Medical News

INDIAN RESEARCH FUND ASSOCIATION

Research Fellowships

The attention of readers is drawn to an advertisement on p. lii for five research fellowships under the Indian Research Fund Association.

This is a new scheme under the fund to stimulate an interest in research amongst the rising generation of medical men. Schemes of proposed work must be submitted and the applications forwarded through the heads of the institutions where the applicants will work.

The heads of institutions which are equipped for research should take this opportunity to encourage suitable men to apply for these posts and give them the necessary facilities for working in their institutions.

It should be noted that the applications must be in by 7th February, 1942, so that the time is very short.

ABSTRACT OF THE RESOLUTIONS OF THE BENGAL COUNCIL OF MEDICAL REGISTRATION AT THEIR MEETING HELD ON THE 12TH AUGUST, 1941

The Council directed that special attention of the Government should be drawn to the following matters :—

(1) Amendment of the Bengal Medical Act, 1914, on the lines suggested by the Council from time to time since 1934;

(2) revision of the curriculum of the licentiateship examination on the lines proposed in 1937, *viz*, with I.Sc. as the preliminary qualification and a course of five years.

(3) amendment of the Governnment resolution of 1938, so as to permit the Council's nominee on the Bengal Sanitary Board to be a member of the Council;

(4) necessary legislation on the lines suggested by the Council in August 1939, so as to prevent the use of the prefix 'Dr.' as a medical qualification by unqualified medical practitioners.

(5) necessary legislation on the lines suggested by the Council in August 1940, so as to prohibit teaching of Western medicine in unrecognized institutions;

(6) necessary legislation on the lines suggested by the Council in February 1941, for penalizing display of unauthorized medical diplomas, titles, etc.

With the sanction of the local Government reciprocity of registration with the Central Provinces and Berar Council for qualifications registrable under the Bengal Medical Act, was recognized.

With the sanction of the local Government, the qualifications of D.P.H. & Hy. from the Faculty of Tropical Medicine, Calcutta, and the D.O.M.S. & D.G.O. of the Bombay College of Physicians and Surgeons, were recognized as additional qualifications of a practitioner already registered on a qualification initially registrable under the Act.

On the question of Birth Control Centres, the Council expressed the opinion that they would not be objectionable provided that they are run by properly qualified registered practitioners and provided further that they do not offend any of the existing ethical rules regarding advertisements, solicitations, etc., or the criminal laws of the country.

A registered medical practitioner who was associating himself with practitioners not registered under the Bengal Medical Act, in the teaching of clinical subjects in an Ayurvedic institution and in practice outside, was held to be a violation of Rule 3, para. 2, in Part I (warning notice) of the Ethical Rules of the Council, and his name was ordered to be removed from the Register.

CARMICHAEL MEDICAL COLLEGE SILVER JUBILEE CELEBRATION

The authorities of the Carmichael Medical College and Hospitals recently decided to celebrate the Silver Jubilee of the institution towards the end of last year.

It is no exaggeration to say that the establishment of this institution ushered in a new era in the realm of medical education, not only in this province alone, but in the whole of India. The creation and subsequent development of this institution proved what by tenacity and sincerity of purpose, non-official efforts could achieve.

An elaborate scheme has been prepared by the Jubilee committee and no pains are being spared to make the function a success and worthy of the nationalistic tradition of the institution.

Sir Nripendranath Sarkar has been elected chairman of the Jubilee committee. A working committee with Sir Nil Ratan Sircar as chairman and nine sectional committees have been formed to work out the details of the programme.

The authorities of the institution in celebrating the Jubilee consider the function as one of stock-taking. They look forward to the future growth and development of the institution. It cannot be denied that the institution has more than justified its existence. Its attainments and growth have been remarkable. The sacrifice of those who have toiled for its establishment does honour to the country. But much more remains to be done and everyone has a part to play in the future growth and development of the institution.

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MALARIA INSTITUTE OF INDIA

WHILST the research activities of the institute have been restricted owing to war conditions, there has been an expansion of the training courses held during the year, says the Annual Report of the Malaria Institute of India for 1940. Special courses have been arranged for military personnel, whilst for the first time malaria courses for engineers were held at the field station of the institute in Delhi. The latter were attended by 61 engineers, representing various branches of their profession, from widely separated parts of India.

Officers of the institute have continued to supervise the anti-malaria campaign which has been carried on in and around Delhi over an area of 55 square miles. Advice has also been given regarding the rural malaria schemes which are in progress in different parts of India. Special research units have carried out investigations in the Wynaad, South India, in the United Provinces, Terai and in the neighbourhood of the Chilka Lake, Orissa.

A number of publications dealing with various branches of malariology have been published by members of the staff, and advice on malaria control measures has been given to a number of workers throughout India. In addition to malaria, problems connected with filariasis and the possible introduction of yellow fever into India have been dealt with.

Fish which feed on the larvæ of mosquitoes have been supplied to various health authorities from the hatchery maintained in Delhi. A number of larvicides and insecticidal sprays have been tested at the field station, and the routine examination and identification of mosquitoes sent to the institute from different parts of India have been carried out as in previous years.

On 1st April, 1940, the public-health section of the institute was taken over by the Government of India. Prior to that date, the whole of the activities of the Malaria Institute of India were financed by the Indian Research Fund Association.

NUTRITION

As was pointed out by Sir John Russell, who toured India a few years ago and made a comprehensive report regarding the agricultural policy to be pursued in this country, the first need was for each province to conduct nutrition surveys to discover the chief deficiencies in diet and then, with the help of the agricultural department and the rural development authorities, to encourage by all means the growth of those particular articles of food which are necessary to make up these deficiencies. Within the last few years, over 50 diet surveys have been carried out in various parts of India and the results of these surveys have been brought together in a booklet entitled 'A note on the results of diet surveys in India', issued last year by the Indian Research Fund Association.

It has been shown by experiment that a partial substitution of rice by wheat or by one of the millets grown in the country improves the diet considerably. The expansion of the cultivation of millets and the encouragement of their use by the people of rice-producing areas require the earnest consideration of the authorities. Pulses can also supply some of the important factors in which rice is deficient. The Imperial Council of Agricultural Research has initiated a co-ordinated scheme of research in the provinces in order to investigate the possibility of developing strains of higher yield as well as of encouraging the extension of areas of pulses under cultivation.

USE OF LEAFY VEGETABLES

THE development of kitchen gardens and wider use of leafy vegetables are also desirable because these vegetables are particularly rich in vitamins A and C and in calcium and form a valuable supplement to rice diets. In India, if efficient methods such as those employed in Japan and Europe are applied to the fish industry, a valuable supplement to the diet of the people can be provided at a low cost.

Researches carried out in the Coonoor Nutrition Research Laboratories and in some other institutions in the country have shown that certain varieties of fish available in Indian waters are particularly rich in vitamin A. A cod-liver oil substitute prepared from shark- and saw-fish-liver oils combined with groundnut oil is being prepared in Travancore, Malabar and Bombay, and, as far as the vitamin-A fraction is concerned, the replacement of cod-liver oil by these locally produced fish-liver oils has now become a practical proposition.

IMPROVEMENT OF GRATUITIES TO EMERGENCY COMMISSIONED OFFICERS OF THE INDIAN MEDICAL SERVICE

FOLLOWING upon a recommendation of the Indian Medical Service Recruitment Conference held in July, Government have now given their sanction to gratuities on a greatly enhanced basis payable to Emergency Commissioned officers.

The minimum gratuity will be Rs. 2,000 for those who obtained their basic registrable medical qualification before the 1st January, 1940, and Rs. 1,000 for those who obtained this qualification after that date.

The minimum gratuity will be earned as soon as an officer completes his first year of service after which he will be entitled to an additional gratuity over and above this minimum, equal to one month's pay for each further completed year of service. The minimum guaranteed gratuity will be admissible to all Emergency Commissioned officers except those who on demobilization are appointed to permanent Commissions, who retain a lien on civil Government appointments or who on demobilization obtain permanent Government employment.

THE DR. SIR BHALCHANDRA KRISHNA, *KT.*, MEMORIAL FUND GOLD MEDAL OF THE BOMBAY MEDICAL UNION

AT a meeting of the Subscribers of Sir Bhalchandra Krishna, *Kt.*, Memorial Fund held on the 11th July, 1924, the following resolution was adopted:—

'That from the funds collected to perpetuate the memory of the late Sir Bhalchandra Krishna, *Kt.*, a Memorial Prize Medal be founded to be awarded every year on the anniversary of his death to a member of the Medical Profession* who submits a thesis or delivers a lecture on any medical subject before a Meeting of the Medical Profession to be held under the auspices of the Bombay Medical Union, preference to be given to one who submits any original or research work especially with reference to Indigenous Medicine on Western lines.'

In consonance with the above resolution, members of the profession are invited to submit a thesis or a paper by the 31st of March, 1942, to the undersigned for submission to a Selection Committee for making the above award.

The thesis or paper shall have to be read by the prizeman on the day of the award at a Meeting of the Profession to be held in accordance with the above Resolution.

All communications to be addressed to The Jt. Hon. Secretaries, Bombay Medical Union, Blavatsky Lodge Building, French Bridge, Chowpatty, Bombay 7.

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*A member of the Medical Profession means:—

All duly qualified Members of the Medical Profession holding degrees and diplomas from:

(*a*) Indian Universities created by statute;
(*b*) Such other universities and Corporate Bodies as the Managing Committee may from time to time determine subject to the approval of the General Body of the Union; and
(*c*) Duly qualified Members of the Medical Profession holding diploma of Membership of the College of Physicians and Surgeons of Bombay.

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Public Health Section

THE VILLAGE *DAI* AND THE RURAL HEALTH PROGRAMME

THE organization in rural areas of maternity and child welfare programmes has drawn attention to many problems concerning the need of trained persons whose services will be available to the women of rural communities during childbirth and the puerperal period, and will be available at prices within the reach of rural families.

Before beginning work and employing personnel, those who wish to organize activities to help to solve the problems must first study the local social and economic conditions, and also the various methods which have been tried in other rural areas; and, for the sake of effectiveness, they should arrange to have their activities included in a general health programme, through which attention would be given to measures designed to bring about improvement of living habits and home conditions.

Those who have studied rural India, where 90 per cent of the people of India live, know that economic conditions in the villages are such that for many years to come the family will not consider paying for the services of trained midwives.

It is impossible for any government to train and place in rural areas, within a reasonably short time, enough *properly* trained midwives to care for all the deliveries, whether on the basis of free service, subsidized service, or private practice.

Well-trained midwives or government midwives who attempt to practise in rural areas receive very small incomes and are hindered by the active opposition of the *dais* who fear that the midwives will eventually take away their practices.

Although the village *dai* has usually never had any training in midwifery or hygiene, she is trusted by the village people, and it is improbable that the village families will change their habits and discard the help of the *dais* within a short time. In many areas social customs still frown upon the employment of trained midwives.

More than 90 per cent of labours follow a physiologically normal course, but the person who delivers normal cases should know something about the value of prenatal care, the elements of hygiene, the simple technique of a hygienic delivery, the importance of non-interference, the important signs of abnormal labour, and the simple hygiene of post-partum care.

Under any programme, the quality of the service supplied and the area served will depend upon the talent, education and training of the members of the personnel, and the funds available for salaries and general expenses.

One hears frequently the statement that since the average village family is unable to pay a trained midwife, government should supply the needed services. This statement leads to the following questions :—

(*a*) What services are most urgently needed ?

(*b*) What is the quality of the services to be supplied ?

(*c*) What is to limit the extent of the services supplied ?

(*d*) Should government supply free services of this sort for all or only for indigents ?

One scheme for rural activities recommends the official training of village *dais*, and the registration and licensing of those who have completed a course of training prescribed by government. The training is given under government supervision by qualified medical practitioners or medical officers of health who are supplied with books, diagrams and materials for teaching purposes, and are instructed to hold courses consisting of twelve lecture-demonstrations in accordance with a definite syllabus. After the close of the course, a *dai* who has attended ten of the lecture-demonstrations is given a certificate and a bag containing various materials and supplies. She thus becomes officially recognized.

Another system recommends a course of one or two years' training in midwifery for young women who have an elementary school education of 7 to 10 years. These women are placed in rural areas as government midwives to supply free service. They are obliged to contend with conservatism, superstition, the opposition of the *dais*, and many other difficulties.

Since the purpose of organizing maternity and child welfare activities in rural areas is to reach as many as possible of the women, infants, and pre-school children, it has been suggested that the village *dais* might be included temporarily in a system organized to supply a service which would be acceptable to rural communities and would gradually be improved in quality.

The *dais* would be employed as usual by the people who would thus bear a share of the cost of the service, and the people would gradually learn to want better midwifery.

The system would depend upon the careful selection and the thorough training of young women who are prepared to follow thorough practical and theoretical courses in midwifery and in maternity and child-hygiene work, extending over several years, and thereafter to live and work in rural areas. They would be placed in areas in which they would organize, at convenient places in villages, centres which pregnant women could visit regularly for examination and advice, to which infants and pre-school children could be brought for weighing, examination and advice, and at which various

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other activities could be carried out. They would not practise midwifery, but would give their time to centre activities, and to demonstrations and discussions through which the village *dais* would gradually learn to care for normal cases of labour in a hygienic manner, in spite of unhygienic surroundings.

The midwife would arrange for each centre, a regular period per week during which the local *dais* would take active part in drills and discussions specially designed to help them to learn thoroughly, through frequent repetition, the hygienic technique of handling a normal labour. There would be no definite courses of instruction, but the opportunity to learn to conduct a hygienic delivery despite unhygienic surroundings would be given regularly, so that all the *dais* of a neighbourhood would gradually learn this technique. The smaller the group at the meetings the better the *dais* would learn the details of the technique.

No certificates or licences would be given, and no responsibility for the work of the *dais* would be assumed.

In organizing such a service it would be necessary that the midwife immediately makes it known in the villages that she will not practise. On this basis it would be possible for her to secure the co-operation of the *dais* instead of their opposition. She must explain carefully that she will have no private practice, will not accept fees or presents of any sort, and will need her entire time and energy for the centres to which the mothers and babies will come for observation and advice.

The *dais* would gradually learn to give their normal cases better care and would also learn that it is to the advantage of their patients and to the improvement of their practice to place all abnormal cases under the care of practising midwives and physicians.

They would learn to bring their patients early in pregnancy to the centres for observation and advice by the midwife, would advise them to visit the centres at regular intervals, and would also help the mothers to bring their infants to the centres for observation.

The village women would soon learn that a labour conducted by a *dai* who has learned to work hygienically and to discard the uncomfortable activities demanded by superstition, is so much more comfortable and peaceful that all *dais* would soon find it advisable to take the opportunity to learn more modern technique.

In areas in which attempts have been made to train *dais*, experience has shown that it is very difficult indeed for physicians to teach in very simple terms. Since the village *dais* are usually not educated and certainly do not understand technical medical terms, they often fail to understand the theoretical lectures and the demonstrations. On the other hand, experience has shown that well-trained midwives can bring their language down to a more understandable level

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CAUSES OF ABSENCE IN COLLEGE-STUDENTS*

By V. KRISHNA ROW
LIEUTENANT, I.M.S.
Medical Wing, Mhow (C. I.)

DURING the last 14 years while acting as medical officer of the Presidency College, Madras, the writer has been conscious of a steady deterioration in the health and physical fitness of college students. This has been shown by the increase in the incidence of physical defects as revealed by reports of routine medical examination from time to time. This led the writer to undertake a careful investigation into health status, physical fitness and the dietary habits of the students. As a part of this study, causes of absence from college were also studied. The present paper deals with this latter aspect of the problem.

A total of 2,925 leave applications during the years 1937, 1938 and 1939 were analysed. Out of the total 2,108 or 72.1 per cent referred to medical reasons. The number of application for different illnesses is shown in table I :—

TABLE I

Medical leave applications

'Fever' group	909
Dental group	42
Eye group	114
Bowel diseases	156
Lung diseases	14
Ear, nose and throat diseases ..	37
Cold and headache	422
Infectious diseases	49
Skin diseases	62
Unspecified origins	209
Injuries	64
Diseases of heart	2
Diseases of kidney	1
Other miscellaneous causes ..	27
TOTAL NUMBER ..	2,108

* Abridged by Editor.

(*Continued from previous column*)

and are patient enough to repeat demonstrations and discussions of technique as often as this may be necessary.

Through this system of temporarily including *dais* in the programme, but only for normal cases and for establishing contact between village women and the health centres, the village women will gradually learn to appreciate the services of well-trained midwives and physicians.

Any system of maternity and child-welfare work should include or be combined with other activities which are designed to improve conditions in the village homes.

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The number of applicants who showed repeated illness was 260 or 12.3 per cent and these are shown in table II:—

TABLE II
Cases of repeated illnesses

Nature of illness	Number of illness
Fever	111
Headache	90
Cold	53
Chest pain	6
TOTAL ..	260

Further analysis of the complaints into specific conditions is summarized in table III:—

TABLE III
Statistics—Analysis of complaints

Fevers ..		43.12%	*Headache* ..		20.02%
Fever ..	729		Cold and headache	139	
Rheumatism	1		Severe headache ..	283	
Kala-azar ..	1			422	
Filarial fever	1				
Influenza ..	83		*Dental trouble*	53	1.96%
Malaria ..	38		*Ear, nose and throat affections* ..		1.75%
Typhoid ..	3		Sore-throat	13	
Fever and cough ..	53		Tonsils ..	17	
	909		Earache ..	7	
				37	
Bowel diseases ..		7.40%			
Appendicitis	2		*Lung diseases* ..		0.66%
Intestinal colic ..	2		Pain in the chest ..	10	
Intestinal troubles ..	11		Pneumonia	1	
Gastritis ..	4		Asthma ..	1	
Stomach ache	72		Tuberculosis	2	
Stomach trouble ..	5			14	
Diarrhœa ..	15				
Dysentery ..	40				
Jaundice ..	4		*Other miscellaneous causes* ..		1.28%
Stomatitis	1		Neuritis ..	1	
	156		To consult doctor ..	17	
			Medical treatment ..	1	
Eye diseases ..		5.41%	Inoculation	8	
Eye pain ..	36			27	
Eye trouble	78				
	114				
			Diseases of heart ..		..
Injuries ..		3.04%	Valvular disease of heart ..	1	
Injuries and sprain ..	64		Low blood pressure ..	1	
				2	
Skin diseases ..		2.94%	*Diseases of kidney*	1	
Boils and abscesses	62		*Unspecified causes*		9.91%
			Illness ..	70	
Infectious diseases		2.23%	Biliousness and giddiness ..	38	
Mumps ..	40		Sick ..	4	
Diphtheria ..	2		Indisposed ..	97	
Smallpox ..	7			209	
	49				

(*Concluded at foot of next column*)

PHYSICAL EFFICIENCY TEST OF SCHNEIDER ON BOMBAY MEDICAL STUDENTS

PART I

By D. M. TELANG

(*From the Physiological Laboratory, Grant Medical College, Bombay*)

THIS test was suggested and published by Schneider in 1920 and later slightly revised by him in 1923 (Schneider, 1920, 1939). It is chiefly meant for assessing the circulatory efficiency of an individual and indirectly his physical efficiency. It is also said to give a quantitative idea of the degree of fatigue. It has been adopted as a test for recruitment to the American Air Service (Scott, 1921).

The reactions of the cardiovascular or neuro-circulatory apparatus to postural changes of the body or to exercise have been considered as criteria of circulatory efficiency for a long time. The reactions are shown by changes either in the rate of the pulse or in the blood pressure. It is held that the lower the variation of the pulse rate from the resting figure, the better the circulatory and physical stability and efficiency of the individual. Another factor is the quickness with which the body adapts its vital processes to a change in its internal or external surroundings; the rapidity with which the pulse rate returns to the resting level, if it departs from this during activity, is therefore held to be a good index of an efficient circulation and physique. The third factor is the blood pressure, and it changes in response to changes of posture or to exercise.

Schneider (1920) has tried to give a quantitative value to this efficiency by arbitrarily choosing six of these factors and allotting to each factor a certain score. When all the six factors are taken into consideration the six scores are added together and their algebraic sum gives the final rating.

(*Continued from previous column*)

Conclusion

The chief causes of sickness among students are—(*i*) fevers, (*ii*) cold and headache, and (*iii*) bowel complaints. This is in striking agreement with the chief causes of mortality among the population, namely, fevers, respiratory diseases and bowel diseases. It shows that if these conditions are treated early they will not develop into serious illness and be the cause of death in later life.

This study also shows that women students fall ill more frequently than male students.

It is suggested that early preventive measures directed against many minor complaints will go a long way in insuring better health for the community. There is necessity for laying down a definite health policy with a view to improving physical fitness, particularly during the early years of life—infancy to adolescence.

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The six factors to which points are allotted are: (1) the reclining pulse rate, (2) the standing pulse rate, (3) the difference between the standing and the reclining pulse rates, (4) the difference between the standing and the post-exercise rates, (5) the time of return of the pulse from the post-exercise to the standing rate, and (6) the difference between the standing and the reclining systolic pressures.

Method

The actual test was performed as follows and practically as recommended by Schneider (1939) :—

The subject—all were medical students between the ages of 18 and 29—was asked to come for the test at least two hours after a meal, refreshment, or smoke. He was then made to lie down on a couch for at least five minutes. In this position the pulse was counted every fifteen seconds till two consecutive readings were the same. This multiplied by four was recorded as the reclining pulse rate per minute (column 4, table II).

The systolic pressure in the same position was then noted down, taking the mean of two or three readings by the auscultatory method (column 10, table II). The instrument used was the B.D. blood pressure floor unit.

The subject with the sphygmomanometer cuff still on was then asked to rise from the bed gently and stand for two minutes to allow the pulse to become steady. The pulse was then counted for every fifteen seconds as before till two consecutive readings were equal and the figure multiplied by four was recorded as the standing pulse rate per minute (column 5, table II).

The increase in the rate on standing was recorded as so many beats per minute ranging from zero when there was no difference between the standing and the reclining rate (column 6, table II).

The standing systolic pressure was then recorded as before, the mean of two or three readings, and its variation, *plus* or *minus*, from the reclining pressure recorded separately as the difference between the two (column 11, table II).

The subject was next asked to step up and down a stool 18½ inches in height five times in fifteen seconds. This exercise was accurately timed by the stop-watch for five counts. The subject was asked to keep his left foot on the stool from the beginning of count 'one' to the end of count 'five'. At every count he was to lift his right foot up and down on to the stool and again on to the ground at the calls 'up' and 'down', respectively, the double movement making one count. At the end of count five both feet had to be down on the floor.

At the end of the fifteen seconds' period of exercise the pulse was counted, and the pulse count was repeated every fifteen seconds for the following two minutes.

The shortest time in seconds of the return of the pulse to the standing rate was noted from this (column 8, table II).

The pulse count for the first period of fifteen seconds after the end of the exercise multiplied by four gave the maximum rate per minute attained by the pulse as a result of that exercise (column 7, table II) and the difference between this and the normal standing rate was recorded for scoring (column 8, table II).

The final rating of the points was done by a reference to the score table given by Schneider (1939), table I. In this table the scores for factors (3) and (4) given above range from +3 to − 3, that for factor (5) ranges from +3 to − 2, and those for the remaining factors (1), (2) and (6) range from + 3 to − 1. The gradation of the efficiency thus ranges between the extremes of +18 and − 11 in any given case when all the factors are considered together.

The subject's previous history regarding athletic and other habits, sleep during the previous night, diet, etc., was inquired into and anything worth while noted down. Observations made on those subjects who gave no history of any recent illness, however trivial, and who had a good previous night's rest have alone been included here.

Results and discussion

The data obtained on 122 healthy male medical students—age group 18 to 29—are given in table II.

The statistical constants of these data are given in table III. It will be seen that most of them have a fairly normal distribution.

The physiological measurements, such as the pulse rate and the systolic pressure under different conditions of body posture and activity, do not show much variability amongst individuals as shown by the relatively low coefficient of variation of between 7 and 11 per cent for the reclining pulse, the standing pulse, the post-exercise pulse and the reclining and standing systolic pressures.

The high variability shown by the difference between the standing and the reclining pulse rates, the difference between the post-exercise and the standing pulse rates, and the difference between the standing and the reclining systolic pressures suggest however that the neuro-circulatory responses to postural changes and to activity of different individuals vary very much.

The most variable of these seems to be the response of the systolic blood pressure to the standing posture, the coefficient of variation in which was extremely high, *viz*, 116 per cent.

The variability of the time of return of the post-exercise pulse to the pre-exercise level was also high.

The range of the Schneider rating was 8 to 16 with the mean at 12.53 ± 0.13 and standing deviation 2.13 ± 0.09. Its coefficient of variation

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TABLE I*

Points of grading cardiovascular changes (Schneider index)

A. RECLINING, PULSE RATE	Points	B. PULSE RATE INCREASE ON STANDING				
		0 to 10 beats	11 to 18 beats	19 to 26 beats	27 to 34 beats	35 to 42 beats
	Points	Points	Points	Points	Points	Points
50 to 60	3	3	3	2	1	0
61 to 70	3	3	2	1	0	— 1
71 to 80	2	3	2	0	— 1	— 2
81 to 90	1	2	1	— 1	— 2	— 3
91 to 100	0	1	0	— 2	— 3	— 3
101 to 110	— 1	0	— 1	— 3	— 3	— 3

C. STANDING, PULSE RATE	Points	D. PULSE RATE INCREASE IMMEDIATELY AFTER EXERCISE				
		0 to 10 beats	11 to 20 beats	21 to 30 beats	31 to 40 beats	41 to 50 beats
	Points	Points	Points	Points	Points	Points
60 to 70	3	3	3	2	1	0
71 to 80	3	3	2	1	0	0
81 to 90	2	3	2	1	0	— 1
91 to 100	1	2	1	0	— 1	— 2
101 to 110	1	1	0	— 1	— 2	— 3
111 to 120	0	1	— 1	— 2	— 3	— 3
121 to 130	0	0	— 2	— 3	— 3	— 3
131 to 140	— 1	0	— 3	— 3	— 3	— 3

E. RETURN OF PULSE RATE TO STANDING NORMAL AFTER EXERCISE	Points
	Points
0 to 30 seconds	3
31 to 60 „	2
61 to 90 „	1
91 to 120 „	0
After 120 seconds: 2 to 10 beats above normal.	— 1
After 120 seconds: 11 to 30 beats above normal.	— 2

F. SYSTOLIC PRESSURE STANDING COMPARED WITH RECLINING	Points
	Points
Rise of 8 mm. or more	3
Rise of 2 to 7 mm.	2
No rise	1
Fall of 2 to 5 mm.	0
Fall of 6 mm. or more	— 1

*At the suggestion of Dr. K. V. Krishnan the table has been added.—EDITOR, *I. M. G.*

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TABLE II

Data of Schneider rating

(1) Serial number	(2) Subject	(3) Age (years)	(4) Reclining pulse (per minute)	(5) Standing pulse (per minute)	(6) Difference between (4) and (5)	(7) Maximum pulse after exercise (per minute)	(8) Difference between (5) and (7)	(9) Time of return of pulse to standing (sec.)	(10) Reclining systolic blood pressure (mm. Hg.)	(11) Standing systolic blood pressure (mm. Hg.)	(12) Difference between (10) and (11)	(13) Schneider rating (points)
1	B.K.N. ..	20	76	86	10	100	14	90	120	116	— 4	10
2	V.J.K. ..	19	76	88	12	106	18	60	122	128	6	12
3	R.M.C. ..	20	72	84	12	96	12	60	128	134	6	12
4	A.K.S. ..	20	68	76	8	88	12	90	116	124	8	15
5	S.R.D. ..	18	76	84	8	108	24	120	124	124	0	9
6	K.R.R. ..	20	72	88	16	112	24	75	112	112	0	9
7	L.U.K. ..	19	84	84	0	92	8	45	112	126	14	14
8	I.A. ..	20	62	69	7	76	7	75	110	116	6	15
9	B. ..	21	60	76	16	100	24	60	108	108	0	13
10	Z.K.K. ..	18	66	76	10	92	16	60	126	128	2	15
11	H.A.R. ..	20	64	76	12	92	16	60	112	122	10	15
12	L.H.V. ..	21	64	78	14	88	10	75	118	124	6	14
13	C.H.P. ..	23	72	88	16	104	16	45	112	120	8	13
14	K.H.S. ..	22	74	88	14	100	12	60	110	120	10	13
15	C.B.P. ..	23	72	76	4	104	28	120	122	126	4	9
16	H.B. ..	23	72	80	8	92	12	45	116	112	— 4	12
17	D.H.M. ..	21	54	80	26	98	18	120	122	128	6	11
18	B.K.K. ..	21	82	84	2	100	16	60	110	120	10	12
19	Y.G.G. ..	21	78	88	10	106	18	45	128	128	0	12
20	M. ..	22	80	88	8	92	4	45	120	126	6	11
21	J. ..	24	68	76	8	96	20	45	112	120	8	16
22	N.G.S. ..	22	64	84	20	96	12	75	102	108	6	11
23	M.D.D. ..	25	64	80	16	104	24	90	114	122	8	12
24	M.D.W. ..	19	68	88	20	100	12	30	110	110	0	12
25	Y.J.F. ..	29	84	88	4	100	12	90	138	138	0	9
26	H.M.T. ..	21	72	88	16	112	24	75	120	130	10	11
27	H.P. ..	23	72	76	4	88	12	60	126	142	16	15
28	C.D.T. ..	21	56	68	12	90	22	75	112	112	0	14
29	B. ..	21	76	88	12	102	14	60	124	128	4	12
30	A.G.M. ..	24	76	88	12	104	16	60	124	124	0	11
31	G.J.A. ..	21	80	100	20	108	8	45	124	130	6	9
32	S.G.D. ..	22	56	80	24	96	16	60	112	116	4	14
33	L.N.D. ..	18	80	96	16	108	12	45	122	128	6	10
34	N.S.D. ..	19	56	68	12	76	8	45	110	112	2	16
35	T. ..	22	74	88	14	104	16	60	116	118	2	12
36	C.D.D. ..	19	62	88	26	100	12	75	100	112	12	12
37	M.P.D. ..	23	76	92	16	100	8	60	128	140	12	12
38	P.P.S. ..	21	68	76	8	92	16	75	120	126	6	14
39	M.A.J. ..	22	76	92	16	100	8	30	124	136	12	13
40	S. ..	23	68	84	16	108	24	60	108	110	2	12
41	N. ..	18	76	84	8	112	28	60	120	124	4	12
42	M.S.A. ..	23	80	88	8	104	16	60	114	126	12	14
43	R.J.M. ..	20	72	88	16	104	16	45	102	118	16	13
44	F.N.G. ..	19	72	84	12	104	20	60	110	120	10	13
45	A.J.V. ..	20	62	80	18	96	16	60	120	128	8	15
46	K.A.M. ..	26	88	88	0	116	28	75	114	120	6	9
47	D. ..	20	52	76	24	100	24	60	110	116	6	13
48	A.C.K. ..	21	64	72	8	84	12	45	106	118	12	16
49	C.H.L. ..	22	68	80	12	102	22	60	116	124	8	14
50	J.N.V. ..	20	72	92	20	100	8	30	108	108	0	9
51	N. ..	19	76	88	12	108	20	60	116	126	10	13
52	K.K.K. ..	21	68	76	8	104	28	120	110	110	0	10
53	S.V.B. ..	21	64	80	16	88	8	45	104	110	6	15
54	B. ..	19	72	84	12	112	28	45	114	120	6	11
55	H. ..	22	68	92	24	112	20	45	116	130	14	11
56	P. ..	21	76	76	0	88	12	45	112	120	8	15
57	A. ..	20	68	88	20	108	20	60	106	106	0	11
58	U. ..	20	68	84	16	104	20	45	124	130	6	13
59	M.A.P. ..	21	70	74	4	90	16	60	118	120	2	15
60	H. ..	21	68	84	16	104	20	90	112	116	4	12

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TABLE II—*concld.*

(1) Serial number	(2) Subject	(3) Age (years)	(4) Reclining pulse (per minute)	(5) Standing pulse (per minute)	(6) Difference between (4) and (5)	(7) Maximum pulse after exercise (per minute)	(8) Difference between (5) and (7)	(9) Time of return of pulse to standing (sec.)	(10) Reclining systolic blood pressure (mm. Hg.)	(11) Standing systolic blood pressure (mm. Hg.)	(12) Difference between (10) and (11)	(13) Schneider rating (points)
61	N. ..	23	60	80	20	82	2	15	126	116	— 10	13
62	A.M.K. ..	22	64	84	20	100	16	45	124	124	0	11
63	C.A.P. ..	22	68	76	8	96	20	45	122	120	— 2	13
64	H.T.C. ..	27	76	92	16	100	8	45	114	120	6	11
65	S.V.A. ..	22	84	84	0	100	16	60	118	124	6	11
66	N.A.D. ..	22	68	88	20	88	0	0	116	120	4	14
67	C.L.J. ..	22	64	88	24	96	8	60	126	126	0	12
68	M.M.P. ..	22	72	90	18	100	10	120	114	116	2	11
69	S.N.R. ..	20	74	92	18	108	16	45	118	120	2	10
70	M.W.P. ..	20	84	94	10	108	14	50	126	132	6	9
71	D.S.D. ..	21	68	80	12	104	24	60	124	130	6	13
72	R.L.D. ..	20	64	84	20	98	14	75	112	112	0	11
73	S.M.W. ..	22	88	96	8	116	20	30	142	148	6	10
74	C.A.S. ..	22	62	64	2	92	28	60	120	122	2	15
75	D.N.P. ..	23	72	84	12	104	20	60	122	130	8	13
76	A. ..	24	84	90	6	110	20	45	122	128	6	11
77	R. ..	23	72	80	8	100	20	60	118	130	12	15
78	G.A.V. ..	20	72	84	12	108	24	90	118	118	0	9
79	C.V.D. ..	21	84	96	12	108	12	45	110	122	12	9
80	M.P.M. ..	22	72	80	8	100	20	75	136	120	— 16	10
81	H.C.J. ..	20	60	90	30	102	12	75	102	108	6	11
82	V.D.B. ..	24	72	84	12	100	16	45	102	116	14	13
83	O. ..	21	74	78	4	108	30	90	130	144	14	13
84	K. ..	21	80	84	4	104	20	45	130	130	0	12
85	D. ..	20	68	88	20	100	12	45	114	122	8	13
86	K.N.D. ..	24	88	96	8	104	8	60	116	130	14	11
87	M. ..	22	68	76	8	96	20	60	120	132	12	16
88	D.P.U. ..	18	72	92	20	100	8	30	116	130	14	11
89	J.F.B. ..	18	72	80	8	92	12	45	124	124	0	13
90	A. ..	20	76	92	16	108	16	60	118	118	0	9
91	M.M.A. ..	23	64	80	16	100	20	60	118	102	— 16	11
92	F. ..	23	62	76	14	84	8	45	102	106	4	15
93	R.K.P. ..	21	72	92	20	104	12	30	128	138	10	10
94	A.V.G. ..	20	72	96	24	160	4	30	104	114	10	11
95	A.J.S. ..	25	84	84	0	104	20	75	126	130	4	10
96	L.S.S. ..	25	68	88	20	104	16	60	104	108	4	12
97	M.K.T. ..	22	72	84	12	100	16	60	120	124	4	12
98	G.D.D. ..	22	72	84	12	100	16	60	112	124	12	13
99	S.B.N. ..	23	56	64	8	92	28	60	108	120	12	16
100	R.N.G. ..	21	64	72	8	96	24	60	126	126	0	13
101	L.N.J. ..	22	68	88	20	96	8	45	104	108	4	13
102	C.J.D. ..	20	54	70	16	90	20	60	102	106	4	16
103	C.M.P. ..	20	60	68	8	88	20	75	116	118	2	15
104	B.S.P. ..	21	76	88	12	112	24	75	128	128	0	9
105	J.N.V. ..	20	72	88	16	104	16	60	116	124	8	13
106	J.M.S. ..	20	80	88	8	108	20	90	106	108	2	12
107	V.S.P. ..	20	60	72	12	84	12	45	116	124	8	16
108	W. ..	21	72	96	24	108	12	45	108	110	2	9
109	M.R.D. ..	21	72	88	16	96	8	30	116	120	4	14
110	H.M.P. ..	20	64	80	16	100	20	75	114	116	2	13
111	N.C.D. ..	24	88	100	12	120	20	60	116	128	12	9
112	V.A.P. ..	21	88	100	12	116	16	45	112	116	4	8
113	C.N.M. ..	21	88	96	8	112	16	60	112	124	12	10
114	S.J.A. ..	18	84	92	8	112	20	60	124	126	2	9
115	B.H.W. ..	20	80	92	12	124	32	45	132	138	6	8
116	P.C.K. ..	21	84	92	8	108	16	45	114	116	2	9
117	N.M.G. ..	21	68	96	28	116	20	90	120	124	4	8
118	R.S.D. ..	23	76	84	8	112	28	90	110	112	2	11
119	M.G.A. ..	20	76	96	20	116	20	60	112	114	2	8
120	J. ..	21	88	88	0	108	20	60	130	132	2	11
121	K.K.B. ..	21	76	84	8	104	20	60	96	100	4	13
122	S.J.P. ..	20	76	84	8	96	12	45	128	126	— 2	11

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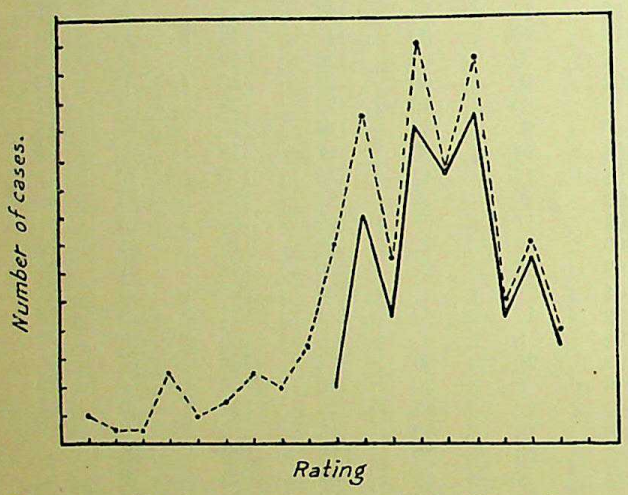
TABLE III

Statistical constants of data

Data	Range	Mean + P.E.	Standard deviation ± P.E.	Coefficient of variation % ± P.E.
1. Age	18–29	21.78 ± 0.11	1.82 ± 0.08	8.3 ± 0.36
2. Reclining pulse (per minute) ..	52–88	73.4 ± 0.51	8.44 ± 0.37	11.5 ± 0.501
3. Standing pulse (per minute) ..	64–100	86.24 ± 0.47	7.76 ± 0.34	9.0 ± 0.39
4. Difference between (2) and (3) ..	0–30	14.48 ± 0.39	6.48 ± 0.28	44.7 ± 2.274
5. Maximum pulse after exercise (per minute).	76–124	101.5 ± 0.53	8.7 ± 0.38	8.5 ± 0.368
6. Difference between (5) and (3) ..	0–32	18.28 ± 0.39	6.44 ± 0.28	35.2 ± 1.525
7. Time of return of pulse to standing (sec.).	0–120	58.89 ± 1.17	19.37 ± 0.85	32.9 ± 1.425
8. Reclining systolic blood pressure (mm. Hg.).	96–142	117.17 ± 0.51	8.5 ± 0.37	7.3 ± 0.3162
9. Standing systolic blood pressure (mm. Hg.).	102–148	122.65 ± 0.53	8.85 ± 0.39	7.2 ± 0.312
10. Difference between (9) and (8) ..	− 16 to + 16	+ 4.92 ± 0.35	5.72 ± 0.25	116.2 ± 5.033
11. Schneider rating (points) ..	8–16	12.53 ± 0.13	2.13 ± 0.09	17.0 ± 0.736

was 17 ± 0.736 per cent. Its frequency distribution polygon is given in the figure.



Frequency distribution polygon for Schneider rating of Bombay medical students. The continuous line represents the selected healthy cases and the broken line the unselected cases.

Jackson (1927) obtained the following figures from observations on the medical students of Minnesota University, America: range of Schneider rating 0 to 18 with the mean at 9.995 ± 0.072; standard deviation 4.147 ± 0.051 and coefficient of variation 41.47 ± 0.59 per cent. His age range was 18 to 39 with a mean of 20.0782 years. He however does not mention whether all the subjects had been free from any history of illness, whether at least two hours had been allowed between the test and the previous meal or refreshment, as also whether the subject had a good previous night's rest. These factors are bound to affect the rating.

Scott's (1921) mean figure for 410 candidates for the American Air Service was 11.078 ± 0.13 with a range from —3 to +18. In his case too no mention has been made about the specific conditions under which the observations were recorded.

No Indian data are available in the literature for comparison with the figures given in the present paper, but compared with the American figures available and given above the mean rating of the Bombay medical students seems to be distinctly high probably because of the selection of the cases and conditions. An analysis of the records irrespective of such selection gave the following results. The frequency distribution is given in the figure.

Total number of subjects:—186.
Range of Schneider rating:— — 1 to + 16.
Mean:—10.925 ± 0.1773.
Standard deviation:—3.585 ± 0.1254.
Coefficient of variation, per cent:—32.815 ± 1.265.

Even when these figures are considered, it will be seen that the mean is higher than Jackson's and practically the same as Scott's. It may be concluded from this therefore that the circulatory—and incidentally the physical—efficiency of the average Bombay medical student as judged by this test does not seem to be in any way inferior to that of the average American medical student or Air Service recruit.

Summary

(1) Data are presented of the rating of the circulatory efficiency—and physical efficiency—of 122 healthy male Bombay medical students as given by the Schneider test.

(2) It is concluded that as judged by this test the efficiency—both circulatory and physical—of the average Bombay medical student is in no way inferior to that of the average American medical student or Air Force recruit.

Acknowledgments

I wish to thank Dr. G. A. Bhagwat for carrying out most of the observations on the students and the students for their co-operation.

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REFERENCES

JACKSON, C. M. (1927). *Amer. J. Anat.*, **40**, 59.

SCHNEIDER, E. C. (1920). *J. Amer. Med. Assoc.*, **74**, 1507.

Idem (1939). *Physiology of Muscular Activity*. W. B. Saunders Co., Philadelphia.

SCOTT, V. T. (1921) .. *J. Amer. Med. Assoc.*, **76**, 705.

PUBLIC HEALTH REPORTS

SEVENTY-THIRD ANNUAL REPORT OF THE DIRECTOR OF PUBLIC HEALTH OF THE UNITED PROVINCES FOR THE YEAR ENDING 31ST DECEMBER, 1940

Cholera.—The mortality in towns and rural areas during 1940 was 1,822 and 24,277, respectively, giving a death rate of 0.33 and 0.56. The death rate for the province as a whole was 0.54 against the quinquennial average of 0.50.

Plague.—During 1940 the mortality recorded in towns was 935 and in the rural areas it was 10,790 giving rates per mille of 0.17 and 0.25, respectively. The provincial death rate was 0.24 against the quinquennial average of 0.37. The Benares and Gorakhpur divisions recorded 11,060 deaths from plague, or nearly 94 per cent of the provincial mortality. Thus, it is in these two divisions and during the first quarter of the year that the epidemic was mostly prevalent. The infection in these eight districts continued practically throughout the year and the worst infected district was Jaunpur. The only districts other than those of Benares and Gorakhpur divisions which showed any appreciable infection were Fyzabad in the eastern part of the province and Saharanpur at the extreme west of the province.

Smallpox.—The mortality in towns and rural areas during 1940 was 3,765 and 12,096. The respective rates per mille of the population were 0.69 and 0.28. The mortality for the whole province worked out at 0.33 compared with 0.24 for the previous quinquennium.

Malaria.—There were 717,319 deaths recorded under malaria during 1940 as compared with 754,168 during the previous year, the mortality rates being respectively 14.82 and 15.58. Six hundred and ninety thousand, six hundred and ninety-two deaths were reported from the rural areas and 26,627 from the urban areas, the respective mortality rates being 16.07 and 4.89. The mortality recorded under malaria is greatly exaggerated and during 1940 formed as much as 68 per cent of the total mortality of the province. This is due to the system of reporting in the rural areas through the village *chowkidar* under which practically all cases in which fever is a symptom are relegated to this group.

Enteric fever.—There were 6,615 deaths from enteric fever during 1940, there being a decrease under this head from the previous year during which year there were 7,367 deaths. The urban and rural areas contributed 3,923 and 2,692 deaths with death rates of 0.72 and 0.06.

Relapsing fever.—The number of deaths reported under this head in 1940 was slightly lower than that in the previous year, the figures being 51 and 187, respectively. The urban and rural contributions were 29 and 22.

Kala-azar.—There were 83 deaths from kala-azar during 1940 against 81 during 1939. The respective urban and rural figures for 1940 were 25 and 58. Recent investigation into the prevalence of this disease disclosed that the districts of Benares and Gorakhpur have been recording the largest number of cases. Government have accordingly made arrangements for the treatment of these cases in five specially equipped centres.

Cerebro-spinal meningitis.—During 1940, deaths from this disease aggregated 76 against 89 of the preceding year. Sixty of these were reported from towns and 16 from rural districts.

Dysentery and diarrhœa.—The third quarter, followed closely by the second, recorded the largest number of deaths. The mortality under this group of causes decreased during 1940 compared to the previous year, the recorded figures being 16,238 and 17,962, respectively. The death rates for these years were 0.33 and 0.37.

Pulmonary tuberculosis.—In 1940 the total number of deaths recorded from pulmonary tuberculosis was 5,839 (5,263 in urban areas and 576 in rural areas), giving a death rate of 0.12 for the province as a whole. Mortality was most conspicuous in the towns of Cawnpore (4.50), Budaun (3.41) and Bijnor (3.66). The number of deaths recorded from tuberculosis of joints was 169 (63 from urban areas and 106 from rural areas). The number of deaths recorded from other tuberculous diseases was 2,010 (1,315 in urban areas and 695 in rural areas).

Epidemic dropsy.—During 1940, 55 deaths were reported from this disease against 29 in the preceding year. Of these 47 were reported from towns and 8 from rural districts. The largest number of deaths (15) was reported from Benares city. All the cases were treated either in the infectious diseases hospitals or at the fixed dispensaries. Necessary preventive measures were taken to check the spread of the disease. People were advised to exclude rice and mustard oil from their diet and to take plenty of green vegetables and fruits.

A new activity of the health unit in Partabgarh during the year was a re-vaccination campaign against smallpox. No less than 26,000 individuals, mostly in villages, were re-vaccinated and the operation was found no more difficult than the primary vaccination of children and infants.

In the reports of previous years have been given details of the work being done in the unit. It is not proposed to re-state them, except that the unit is being increasingly used for purposes of practical demonstration to workers in rural hygiene for investigation, experiment and research on public health problems and for epidemiological studies. Studies in the designing and construction of village sanitary conveniences are being continued and public preferences for the different types are being investigated.

Collaboration with the rural development organization is one of the most important duties of the district health staff. The department has issued orders in consultation with the rural development officer that co-operative efforts should be made to improve village sanitary conditions through persuasion or, if necessary, by prosecution of all delinquents.

Current Topics

Cholagogues and Drugs Acting on the Liver

By CHARLES NEWMAN, M.D., F.R.C.P.

(From the *Practitioner*, Vol. CXLV, November 1940, p. 361)

IN the old days, when 'a sluggish liver' was one of the most common of minor diagnoses, cholagogues loomed large in the pharmacopœia. After a period of neglect, there are signs of a return of interest in this group of drugs, an interest which reflects the modern tendency to attribute once again a good many indefinite disorders to deficient activity of the liver. Migraine, for instance, which used to be a 'bilious headache', is being more and more associated with failure of either the liver or the extra-hepatic biliary tract, ever since the French description of 'migraine biliaire' or 'duodénale' drew attention in this direction. And just as there seem to be allergic factors in the causation of migraine, so the rest of the possibly allergic disorders are beginning to be suspected of hepatic origin. Instances of a possible hepatic factor in diseases associated with or due to metabolic disorder might be multiplied indefinitely.

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One of the first results of this renewed interest has been the separation of the 'cholagogue' drugs into two groups:—(1) Drugs which cause an increased secretion of bile by the liver which are referred to as choleretics (on the analogy of 'diuretics') and (2) drugs which empty the gall-bladder, and so cause an increase of bile-flow into the intestine without necessarily increasing the amount secreted.

The second important modern change has been the understanding that in gall-stone formation (at any rate so far as concerns the common and clinically significant type, the multiple faceted stone), it is not so much an increase of cholesterol in the bile which does harm as a decrease in the bile-salt content. The bile salts keep the cholesterol in solution and, so long as it is kept in solution, it can cause no trouble. For this reason, the bile-salt content becomes the important factor. It is also important in the case of pure cholesterol stones, even if these are the result of an increase in the absolute quantity of cholesterol in the bile.

The third important principle is the appreciation of the fact that so-called biliary stasis, the failure of the gall-bladder to empty properly, is very rarely the result of weakness to be treated with stimulants of gall-bladder contraction, but is usually caused by reflex spasm which prevents the outflow of bile, and which is properly treated by continuous sedative therapy.

With these three principles in mind, it is possible to apply treatment much more rationally. Choleretics are indicated when there is reason to believe that the secretion of bile needs stimulation; bile salts should be given when it is desired to make the bile a better solvent for cholesterol (or, of course, a better digestive juice for the absorption of fats, sterols and fat-soluble vitamins); cholagogues, in the strict sense, are rarely to be recommended but, to flush the biliary system or to relieve obstructions, sedative treatment is often very effective.

Choleretics

What then are the genuine choleretic drugs? From the vast volume of work done on the subject and the enormous number of drugs investigated, one group stands out in efficiency: the *bile acids*. They are, without doubt, the most powerful choleretics available; they increase both the quantity secreted and also the bile-salt concentration of the bile. That this is a most fortunate combination of effects is obvious. There are many bile acids, natural and synthetic, from which choice may be made. *Taurocholic acid* and *glycocholic acid*, or preparations of bile, are effective, but not so good as *desoxycholic* or *dehydrocholic* acids. All, however, except dehydrocholic acid, increase the absorption of sterols from the intestine; indeed it is said to be as easy to increase the cholesterol content of an animal by administering bile acids as by feeding it on cholesterol. Therefore if an increased absorption of fats and sterols from the intestine is wanted, rather than a change in the composition of the bile, one of the two common bile acids, or desoxycholic acid, is indicated. If, on the other hand, choleresis without increased absorption of cholesterol is required, dehydrocholic acid should be chosen. Its sodium salt, often called by its trade name of 'decholin' is efficient, non-toxic, suitable for intravenous administration if necessary (it is commonly used for estimating the circulation time) and can be given conveniently in 10-grain doses by mouth after each meal.

Details about all the other reputed choleretics and cholagogues can be found in Sobotka's 'Physiological Chemistry of the Bile', but one or two are worth mentioning here. Sodium salts are useless, but *potassium salts* are choleretics. Of the salts, the natural Carlsbad Sprudal salt is much the best. Increased water intake so far from increasing bile secretion seems to diminish it, and the argument by analogy from diuresis is quite unsound. A high protein diet increases bile secretion, carbohydrates do not. Alcohol and narcotics generally cause a decrease, but avertin increases bile secretion. *Salicylates* increase the volume of bile produced, but diminish its total solids. The purges, including calomel, have little or no effect, but oil of *peppermint*, *dandelion* and *radish* are all choleretic.

Cholagogues

With regard to the emptying of the gall-bladder (pure cholagogue action) in normal subjects, *magnesium sulphate*, *fats*, *eggs*, *vegetable oils*, and *vagal stimulant drugs* all have the effect of rapidly emptying the gall-bladder. Even the hypnotic suggestion of appropriate foods is effective, and the emotions control the activity of the gall-bladder to a considerable extent. Wittkower found that whereas fear and joy increased bile-flow, anger stopped it completely; it is well known that a meal eaten in anger is badly digested, and there are people with 'bilious tempers' who make themselves ill by being angry about their food. In patients with gall-bladder disease, stimulation of any kind usually has the effect of causing a complete spasm which arrests bile-flow (this, of course, is why such substances often precipitate an attack of gall-bladder pain). Proper sedative treatment with belladonna will, however, restore a more normal state, in which it is often beneficial to give, for example, a dose of fat last thing at night, or of magnesium sulphate in the morning. But it is worth while to remember that, unless the patient needs the extra nutrition, there is no need to stimulate the gall-bladder with fats; it empties itself perfectly well in a state of comparative inertia, provided spasm is eliminated.

Sedative treatment

The proper way to ensure that the gall-bladder empties in patients suffering from cholecystitis or gall-stones is to eliminate reflex spasm. If all the musculature of the extra-hepatic biliary tract is relaxed, bile can pour out from the liver under its own secretion pressure, and the gall-bladder itself will almost empty by virtue of its elastic fibres. Complete paralysis would, it is true, lead to a passive distension, but complete paralysis cannot be produced by medication. The best sedative is *tincture of belladonna*. The natural alkaloids in the tincture are better than atropine, which is racemic and not lævorotatory. The only essential in treatment with belladonna is to find out the correct dose for the particular patient. It is universally recognized that the proportional dose for small children is higher than for adults, but it is not so generally realized that 30 minims will not affect one adult so much as 10 minims will another. And yet the effect of belladonna is so definite that, as with digitalis, it is essential to ensure that it produces just the effect desired. Some patients need as much as 40 minims three times a day to produce an appreciable effect; a very few are extremely sensitive and suffer from mental effects with as little as 2 minims. Indeed, it is impossible to treat this latter class with belladonna or atropine at all.

The technique is first to give a test dose of 2 minims. This, in an atropine-sensitive patient, will produce a mild disorientation lasting only a short time but always recognized by the patient. If a larger dose is given, there is a risk of producing serious temporary mania. When it is proved that the patient is not sensitive, start with 10 minims and increase the dose by 2 minims on each occasion, so that the last dose on the third day will be 26 minims. When the limit is reached, there will be a complaint of dryness in the mouth, difficulty in reading, or flushing after the dose; these are the most common symptoms of poisoning, in that order. Do not tell the patient what to look out for; he will notice it, and complain in due course, and if forewarned will probably imagine symptoms prematurely. In fact, if there is any complaint on a dose of 10 minims, it is best to increase it at once to 15, to make sure, because if it is found to be genuine, it is likely that belladonna treatment is not really indicated. When the limit is reached, cut down the dose by 2 minims, or more, to a convenient figure, and rewrite the prescription to a conventional dose. It can then be given for as long as is necessary.

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Belladonna is perfectly safe given in this way, even over long periods. It has no ill-effects, and is a drug of addiction only in the sense that patients are often unwilling to give up what has done then so much good, even when it is no longer necessary. It is usually best to give alkali at the same time: high acidity of the gastric contents contributes to biliary spasm, and gall-bladder dyspepsia is often helped by sodium bicarbonate. A good vehicle is tincture of rhubarb and water; it has a very comforting effect on the stomach in many diseases of the liver.

DRUGS ACTING ON THE LIVER CELLS

In cases of parenchymatous liver damage, cholagogues or choleretics have often been used in the past, but it has become understood that there is little point in trying to make a diseased liver secrete bile, and that when bile salts are not being excreted by the liver their administration may be actually deleterious.

THREE VALUABLE REMEDIES

For the treatment of the parenchymatous cells of the liver there are a certain number of drugs of known value, and a large number the efficacy of which is believed in with little or no scientific proof. Easily at the head of the list of valuable drugs comes *glucose*. This is admittedly a food, and dietetics fall outside the scope of this article, but it is more than a food to the liver; it is essential to the process of glycuronation, besides being the substance from which it derives its energy. However it exerts its remarkable power on the liver, one thing is certain: that the liver deprived of glycogen falls an easy prey to any toxic process, and is likely to be affected by the fatty change in the portal zone, associated with ketosis and enforced fat metabolism. It is better to give glucose as such than to rely on the patient's digestion of starchy or sweet foods. It is difficult to give too much because the patient refuses to take it when he becomes satiated; indeed the art of giving glucose is to present it in palatable forms. Sweets and barley-sugar may suffice for a short time, but their appeal soon wears off, and the familiar bottle of barley-sugar by the bedside, although academically reassuring, is of little value to the invalid. Glucose-sweetened lemonade is better, made from fresh lemons, but this should be changed for other fruit drinks before it becomes tiring. It is the lemon taste which the patient comes to dislike: this can be minimized by not putting peel in the lemonade. Grape-fruit juice or pineapple juice are both admirable substitutes; orange juice is not so good because it is sweet enough already, and it is important not to nauseate the patient with sweet things. It is wiser to fall short of the desired amount of glucose than to let a patient 'turn against' sweet drinks. If fruit flavours pall, glucose solution slightly acidulated with citric or tartaric acid, freely diluted with soda water, may be tried; the carbon dioxide largely paralyses taste. Glucose should be given in any case of liver disease in which the polygonal cells are, or are likely to be, affected, and the amount required should be directly proportional to the risk of liver necrosis ('liver atrophy'). *The risk* is the indication, not the fact. Necrosis of the liver is too dangerous to be awaited, it should be prevented. This is not so difficult as it sounds, if it is remembered that almost all diseases of liver cells resemble 'delayed chloroform poisoning', in that the clinical evidence of liver necrosis follows the actual damage, after an interval; the liver is poisoned first and the patient is poisoned subsequently by the failure of the liver. Even catarrhal jaundice is a 'delayed' liver disease; the damage is done during the prodromal period before the jaundice appears. Give glucose in any case in which the liver is likely, on grounds of clinical experience, to suffer, not forgetting such possible causes as passive venous congestion in heart failure and severe cases of Graves' disease or pneumonia.

Next to glucose comes *calcium*. There is experimental as well as clinical evidence for this. There are two ways of increasing the amount of calcium available for the liver; one is to give it in a form which will be absorbed, the other to mobilize it from the bones by giving acids. Calcium lactate is not sufficiently absorbed to be the perfect form to administer, and acidification is better avoided because the liver works best with a plentiful supply of alkalis. There are two methods of administration: the oral and the parenteral. The oral suffices for the least urgent cases, but the parenteral is the method of choice in emergencies, and has the advantage that it is known that the calcium is arriving where it is needed and in what amount. Orally, calcium sodium lactate is certainly efficient. It is best given in doses of 20 to 60 grains three times a day. Calcium chloride is a gastric irritant, but small doses of 1 to 2 grains in weak solution (½ to 1 per cent) are usually innocuous. Other forms of calcium may be effective when given by the mouth, but the above are of known efficacy. By injection, calcium chloride, 1 per cent in distilled water, may be given with care. It is dangerous to inject it rapidly, as it stops the heart, and 20 minutes should be taken to give the dose of 100 c.cm. Calcium gluconate or lævulinate, which may be obtained ready for injection in ampoules (10 c.cm.), is better, but even this is not fool-proof; it is easy to stop the heart by injecting calcium, even in this form, if it is done rapidly. A simple safety device is to use a fine hypodermic needle for the intravenous injection. It seems absurd ever to use anything else, except for blood transfusion, but there is a common prejudice in favour of 'vein puncture needles' for anything to do with veins. Never inject calcium into anything but a vein: it can cause unpleasant necrosis of tissue and, even if the practitioner cannot see the necrosis of an intramuscular injection, the victim can feel it. If calcium is being given by injection, one dose a day is enough.

The other drug which seems to do good in diseases of the liver cells is *sodium bicarbonate*. Any alkali will do, but this is the natural one and the easiest to obtain. The evidence for its value is not nearly so good as it is for glucose and calcium, but there seems to be at least clinical evidence in its favour. There is no need to make the urine alkaline; 10 grains, three times a day, is enough.

Examination of the Heart for Military Service

By F. M. SMITH, M.D.

(From the *Journal of the American Medical Association*, Vol. CXVII, 2nd August, 1941, p. 329)

THE determination of the fitness of the heart for military service presents problems that are seldom encountered in civil practice. Thus it is frequently necessary for the examiner to rely on signs alone, and these may be of questionable significance. Tachycardia, systolic murmurs and slight elevation in the blood pressure are commonly observed. Certain persons with tachycardia give poor response to exercise. This may have resulted from sedentary life or from chronic infection, or perhaps the history may disclose that it has been present since childhood.

Acceleration of the cardiac rate is often the first and may be the only feature that attracts the attention of the examining physician. This is usually due to excitement incident to the examination and thus promptly subsides as the subject becomes relaxed. If, however, it persists, a careful search for a cause is demanded. Tachycardia may be caused by various conditions but is more commonly due to infection or irritable heart.

The response of the cardiac rate to a given amount of exercise does not necessarily provide information concerning the efficiency of the heart, nor does it determine the presence or absence of disease. It is of value, however, in estimating the general physical fitness. If the rate becomes excessive and the time required for it to return to the original level exceeds two minutes, the response is not satisfactory. This is often due to poor

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physical condition from various causes and not to the heart alone. Thus the response of persons with chronic valvular heart disease may be good, whereas that of one who has led a sedentary life or has an infection may be poor. In questionable cases the history with reference to the participation in physical activities and the response provides much better means of estimating the possibilities of the individual, provided he is free from disease. If it is found that he has been capable of withstanding strenuous exercise in the past, there is good possibility that he may qualify for military service.

The work of the cardiovascular boards during the first World War was chiefly concerned with the examination of men presenting varying degrees of irritable heart, commonly designated as neurocirculatory asthenia, or effort syndrome. The reduced tolerance to exercise is the most characteristic feature of this disorder. Thus on slight or moderate exercise the subject experiences shortness of breath, palpitation of the heart and fatigue comparable to that normally produced by the more strenuous and sustained form of physical effort. Others in addition may have various other symptoms, such as precordial distress, giddiness or perhaps headache. All have unstable vasomotor systems, perspire freely and present cyanosis of the hands when the latter are in the dependent position. Some give a history of having had reduced tolerance to exercise since childhood. In another group the condition was associated with various chronic infections, particularly pulmonary tuberculosis, or followed severe acute infection, such as influenzal pneumonia. Finally in a number the disorder developed while engaged in active warfare. In this connection the series of cases studied by Lewis are of particular interest. Lewis found that the majority of his patients were recruited from sedentary or light occupations. Moreover, the history disclosed that a large percentage of this group had the disorder in civil life and that many of these had been forced to adopt sedentary occupations. It is apparent from the results of this analysis that it is commonly possible to discover or suspect this condition before the subject is inducted into military service.

Alterations in the character of the heart sounds are seldom of much help in the diagnosis of heart disease. Accentuation of the first sound at the apex may be a prominent feature in mitral stenosis. However, it is generally associated with presystolic murmur. In the early stages of mitral stenosis the murmur is frequently confined to a small area and may not be elicited except immediately following exercise, particularly with the subject in the recumbent position and turned toward the left side. Intensification of the second pulmonic sound is present in mitral stenosis, and a loud aortic second sound results from hypertension. Alteration in the character of the latter, especially tympanitic quality, is occasionally the first feature to suggest syphilitic aortitis and the possibility of a diastolic murmur. This murmur may escape detection unless a careful search is made. It is more easily heard by direct auscultation when the subject is in the sitting posture and while he is holding his breath after complete exhalation.

Systolic murmurs over the apex and the pulmonary area are common in men of the draft age, especially in those with tachycardia and slight elevation in the blood pressure. These murmurs are usually soft blowing in character, seldom transmitted to any significant extent, and frequently are altered by posture and respiration. Those of the cardiopulmonary variety are loudest at the end of inspiration and may entirely disappear at the end of forced expiration. There are many instances in which a final decision is dependent on additional information. This is especially true if the murmur is rather prominent and is constantly heard when the subject is in the standing and recumbent positions. A harsh murmur at the apex is invariably indicative of structural alterations in the mitral valve and it is generally possible to demonstrate a presystolic murmur. In many instances, however, the history is negative for rheumatic fever. Levine has emphasized the importance of grading murmurs with reference to their intensity and states that those of grade 2 intensity and above are generally due to organic disease. He further points out that a systolic murmur has greater significance if the heart rate is slow, the blood pressure is low and there is no anæmia. It is, of course, well to bear in mind that a faint systolic murmur at the apex may be on an organic basis; consequently the correct evaluation of this sign is of great importance. The history of rheumatic fever, a diastolic murmur or increase in the size of the heart settles the issue.

A harsh murmur with the greatest intensity over the pulmonic area in the third and fourth left interspace, particularly when accompanied by a thrill, is generally due to one or more congenital anomalies. Further confirmation is obtained by the size and shape of the heart and by the electrocardiogram, if there is a conspicuous right axis deviation. The history is usually negative for rheumatic fever but may disclose that a murmur has been present since infancy.

The size of the heart is often the deciding factor in determining the presence or absence of heart disease. Ordinarily it is possible to locate, with a fair degree of accuracy, the left border of the heart by percussion. This is best accomplished with the subject in the sitting position and by direct percussion. If there is doubt regarding the results, they may be checked by the location of the apex impulse. In the normal subject the apex impulse is limited to a relatively small area and usually located in the fifth interspace, well within the nipple line. The outermost point at which the examining finger is raised by the heart represents the left border at this level and generally checks with the results obtained by percussion. The location of the apex beat varies with the type of chest. Thus in those with short thick chests it is at a high level and may extend to the nipple line. In general, however, if the apex impulse extends beyond this point it is indicative of cardiac enlargement. An unduly prominent apex beat or one occupying a relatively large area is ordinarily associated with enlargement of the heart. In persons with a thin chest and a hyperactive heart the impulse may be rather diffuse. This, however, disappears with the recession of the cardiac rate.

Frequently the blood pressure is slightly elevated with tachycardia but usually returns to the normal with the disappearance of the latter. If under these circumstances and after repeated determinations the systolic pressure is 150 or more and diastolic is 90 or more mm. of mercury it is indicative of hypertension. Further investigation may demonstrate the presence of albumin and casts in the urine or, in rare instances, coarctation of the aorta. In the vast majority of cases no cause is found and the condition is listed as essential hypertension.

Special laboratory procedures, such as the use of the roentgen ray and the electrocardiogram, are seldom necessary in this type of examination. Occasionally a roentgenogram is advisable to check the size and shape of the heart. In rare instances it may be difficult to differentiate between premature beats and auricular fibrillation by auscultation, and thus an electrocardiogram is indicated. Auricular fibrillation, however, is generally associated with obvious structural changes in the heart. Sinus tachycardia may suggest paroxysmal tachycardia or perhaps auricular flutter. The fact that the cardiac rate in the former subsides with relaxation dispels any doubt about the situation. Finally the taking of an electrocardiogram may be justified, if the heart rate is unusually slow, in order to rule out the possibility of auriculoventricular block.

Summary

The determination of the fitness of the cardiovascular system for military service may be difficult because it is frequently necessary for the examiner to rely on signs alone and often these are of questionable significance. Tachycardia, systolic murmurs, slight elevation in blood pressure or a combination of these are the features that usually attract the attention of the examining physician. These are commonly of no importance, but they demand careful investigation. That tachycardia may lead to the disclosure of infection, particularly pulmonary tuberculosis. Moreover, in certain of the remaining, the

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response to exercise may be poor and further study may reveal the presence of an effort syndrome. Systolic murmurs should always be carefully evaluated. The history may give important, or even decisive, information. Finally, a decision regarding slight elevation of the blood pressure is not justified until the cardiac rate has receded to the normal level.

Dyspepsia

By G. EVANS, M.D., F.R.C.P.

(From the *Medical Press and Circular*, Vol. CCIII, 10th April, 1940, p. 303)

THE term dyspepsia is commonly used to describe symptoms due to functional disturbance of the stomach without gross structural change. This definition excludes organic diseases of the stomach, such as ulceration, new growth, hour-glass stomach and pyloric obstruction, but in clinical practice it includes some forms of gastritis and duodenitis. It also excludes symptoms primarily due to intestinal disorder, although it is recognized that there is some justification for using the term 'intestinal dyspepsia' for disturbances of bowel function. Thus Sir Arthur Hurst's term for intestinal disorder due to a failure of carbohydrate digestion—intestinal carbohydrate dyspepsia—is generally accepted. Even with these limitations in the definition of dyspepsia, the subject is one of vast extent. As Sir Walter Langdon Brown has said, the stomach is more often sinned against than sinning. Any loss of health may upset the stomach. In fact, the complete diagnosis of dyspepsia may involve the whole gamut of medicine.

DIAGNOSIS

The diagnosis is made in successive stages. The diagnosis at one stage must be carefully made before the next stage is disposed of. The several stages must be kept distinct in the examiner's mind in order that whenever a case is reviewed each stage may be checked up and reconsidered separately.

Stage 1: *Symptomatic diagnosis.*—The patient reports symptoms of dyspepsia, generally in terms of indigestion. Is his diagnosis correct? A detailed account of his sensations is the first step in diagnosis. This account is a record of actual sensations, their quality, intensity, location and radiation: their onset, duration and relief: the conditions that seem to determine them, and the conditions which give relief, together with associated sensations arising from other parts of the body. These sensations form the *present symptom picture.* Its description by the patient unburdens his mind. Its reception by the examiner relieves the patient of the need to keep in mind many things he has been trying to remember to tell. His attitude changes when he has finished describing his symptoms in every detail. He came for help and now he is ready to help. Inquiry is next made as to the onset of the symptoms. The *initial symptom picture* is likely to be clearer and more definite. It is uncomplicated by subsequent developments. The patient only remembers the salient features of his first sensations and, especially if he was symptom-free before the onset of his dyspepsia, the initial sensations will have made a very clear impression on his mind. Finally, the intervening period is filled in. The initial, intervening and present symptom pictures together make the *complete symptom picture.*

In taking this history step by step inquiry proceeds simultaneously in other directions (along which the patient is apt to digress all the time) with the object of linking up the symptom picture with various phases of physical and emotional activity. A definite time relation of the symptoms with gastric activity establishes the anatomic diagnosis, and it serves to make the differential diagnosis between dyspepsia and intestinal dyspepsia. The relation of the patient's symptoms to changes in his environment, internal and external, physical and mental or emotional throws light on their possible causation.

The importance of elucidating and recording the *complete clinical picture* in all its detail cannot be over-emphasized. If the diagnosis of dyspepsia is wrongly made the examiner is likely to conduct the rest of his examination on the wrong basis. For instance, a patient reports a little sensation of fullness after food high up in the abdomen. The quality of the sensation, its location and relation to food, may lead the examiner to diagnose dyspepsia. At a later date, when the present symptom picture makes the diagnosis obvious, a review of the initial symptom picture may reveal the fact that the earliest sensation was actually of something sticking: its location was under the xiphisternum, and not high epigastric: it was felt actually during the act of deglutition, and not after the food was completely swallowed. In such a case the diagnosis of carcinoma of the gullet is delayed weeks or even months. The usual short cut to diagnosis of gastric disorder, a barium meal *x*-ray examination, may seem to confirm the diagnosis of dyspepsia by its negative finding, and this, of course, is due to the original wrong diagnosis having led to the examination of the wrong organ.

Stage 2: *Differential diagnosis between functional and organic disease.* (*a*) *Organic disease of the stomach.*—The diagnosis of dyspepsia depends largely on the exclusion of organic disease, and the possibility of its location in the stomach comes up for first consideration. Organic gastric disease must be assumed if the patient complains of actual pain having a gastric reference. In fact, it is the best practice to assume that all abdominal pain has an organic basis until the assumption is abundantly disproved. The symptom picture of organic gastric disease is more definite than that of dyspepsia. The symptoms themselves tend to be more sharply defined, and more regular and persistent in making their appearance. The picture of peptic ulceration, at least in its initial symptom picture, the sequence of food and pain, the alternation of remission and relapse, are too well known to require description. The peculiar loss of appetite, at a later stage, the nausea and constant slight pain, are characteristic of neoplasm. The character of the vomiting and the vomitus makes the diagnosis of pyloric obstruction a simple matter when it is well established. Hæmatemesis and melæna have obvious significance. But as medicine is now practised, we have learnt to rely on no single method of investigation. *Organic disease must be looked for to be found.* The symptom picture may be that of dyspepsia. Clinical examination may be negative, even that slight sense of localized resistance on palpation of the upper abdomen (so suggestive of underlying organic disease) may be absent: nevertheless, further examination of the digestive tract must be made if there is any doubt as to the diagnosis, or if the symptoms persist in spite of treatment. A blood count, examination of the fæces for occult blood (after proper preparation of the patient and with due regard to the many fallacies), and a barium meal *x*-ray examination of the œsophagus, stomach and duodenum, are the first additional examinations to be made. In some cases, such as suspected neoplasm of the stomach, pernicious anæmia and essential hypochromic anæmia, a fractional test meal may be advisable.

(*b*) *Reflex dyspepsia.*—First consideration is given to the digestive tract. In defining the complete symptom picture it may become recognized that there are two or more symptom pictures in the patient's story. There may, for instance, be an irregular dyspepsia characterized by occasional loss of appetite or distaste for certain foods, fullness after meals and flatulence upwards, symptoms suggestive of gall bladder dyspepsia. In addition, there may be an account of symptoms of biliary colic with or without jaundice. And in the same patient there may be a third symptom picture due to dyschezia, congenital or acquired. Each one of these symptom pictures carries with it its several differential diagnoses. Biliary colic, in a doubtful case, for instance, turns the examiner's mind to the possibilities of peptic ulcer, appendicitis, renal colic (right-sided), hiatus hernia and allergic reaction to some

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food. Or, if the symptom picture of dyspepsia is complicated by the symptom picture of appendicitis, however indefinite it may be, the varied differential diagnosis of right iliac fossa pain comes up for review. The differential diagnosis of reflex dyspepsia extends, of course, to organic disease of every abdominal and pelvic organ. It extends especially to every organ supplied by the vagus nerve. We know dyspepsia as the common presenting symptom picture of pulmonary tuberculosis, as well as a common complication of heart disease. Disease of the nervous symptom, whether functional or organic, may be responsible for symptoms of dyspepsia. Visceral crisis of tabes dorsalis, and the vomiting due to increased intracranial pressure, do not, of course, come within the picture of dyspepsia, but these same diseases may disturb gastric function in minor ways at an early stage in their evolution, and organic disease of the nervous system must be excluded in making the diagnosis of dyspepsia.

It follows from this that the patient's history, after the complete symptom picture is completed, and associated symptoms have been described, must include a statement under past history as to whether or not he or she has suffered from jaundice, appendicitis, dysentery, colitis and piles, or has been to the tropics. This series of questions is generally sufficient to direct the patient's attention to other possible abdominal complaints. It should also include inquiry as to past respiratory illness, such as bronchitis, influenza, pneumonia, and pleurisy. Family history, too, may throw light on the diagnosis, because some forms of dyspepsia and some of its causes tend to run in families.

The clinical examination is the routine overhaul which establishes integrity of the central nervous system, the heart and lungs. It must always include examination of the urine, estimation of the blood pressure and record of body weight. Endocrine disorder is to be looked for. A blood count is one of the first special examinations to be made. With regard to abdominal examination, a detailed routine should be followed, beginning with inspection, and including examination of the hernial orifices and the linea alba: careful palpation of the gall bladder, appendix and renal regions: careful palpation of the gastric and duodenal regions: a rectal examination should be made in all cases, or if omitted the fact should be recorded.

Stage 3: *Ætiological diagnosis.*—The line of investigation conducted to establish the ætiology of dyspepsia proceeds from a consideration of the present to the past, and from a survey of simpler factors to those more difficult to assess.

(*a*) *Digestive function as a whole.*—The stomach is just a part of the whole digestive tract, and disorder of one part of this tract often refers its symptoms to another part of the tract, and generally in a proximal direction. It follows, therefore, that intestinal dysfunction is often registered in symptoms of dyspepsia. Inquiry into bowel function is therefore essential. This inquiry especially concerns defæcation, and as to whether the stool evacuated is normal, and whether or not it is accompanied by a sense of completion: whether or not laxatives are taken and, if so, what kind, what quantity, how often, and at what time of day. Apart from the bowel dysfunction that the habitual use of laxatives is liable to cause, laxatives may themselves cause dyspepsia.

(*b*) *Dietetic factors.*—Under this heading is included a consideration of everything that reaches the stomach *via* the gullet. Food that is not good, that is in itself indigestible or badly cooked, is a common cause of dyspepsia: or when the food is good in all respects indigestion may be due to excessive intake. Foods more likely to tax gastric digestion and upset the stomach are fats, especially fat that has been over-heated as in frying, and starch cooked with fat. A general rule, therefore, in the treatment of gastric dyspepsia is restricted fat intake. Another cause of dyspepsia is insufficient mastication due to hurried eating or deficient masticating surface. Food idiosyncrasies have also to be borne in mind, and in taking history inquiry is always made as to a past history or family history of allergic disease, and possible food idiosyncrasy. Among obvious gastric irritants are excessive use of condiments, excessive intake of alcohol, tea, coffee and iced drinks. These factors are well known, but it is not so well appreciated how many people have an idiosyncrasy to certain forms of alcohol, and that even one glass of sherry or one whisky-and-soda a day may upset the digestion of some people who happen to be intolerant of it. In other cases the fault lies in the opportunity provided for the stomach to do its work. Thus dyspepsia may be due, for instance, to breakfast being eaten too soon after getting up, or to the patient starting the day's activity too hurriedly after finishing a meal.

(*c*) *Gastric tone and motility.*—More difficult factors to assess are those which concern emotional tone and exhaustion states. Physical fatigue is a direct cause of dyspepsia, as when a man eats his evening meal too soon after return home, exhausted by a day's work. Emotional tension and strain are equally potent causes of dyspepsia. When these factors are occasional their connection with gastric disturbance is easily recognized, but in some patients they are habitual, and the patient is unaware of his nervous state or, if conscious of it, may regard it as natural. Another large group of cases have a psycho-neurotic background.

(*d*) *System function as a whole.*—This is too large a subject to be dealt with adequately, but some brief reference must be made to it. Any considerable or persistent disorder of function of any of the body systems may be a cause of dyspepsia. The importance of emotional states and psycho-neurotic factors has been referred to in the previous paragraph. Other functions of the central nervous system, especially sleep, and the function of the special senses may be ætiological factors. Of equal importance is the functional and structural integrity of the locomotor system. Thus in some cases causes of dyspepsia may be found in bad stance and posture or under-developed respiratory movement. The condition of the feet, such as hallux valgus, pes planus, corns and bunions causing symptoms, spinal deformities, congenital and acquired, and loss of tone in the muscles of the abdominal wall, are all factors which may be of importance in determining dyspepsia, or maintaining it when established for some other reason.

TREATMENT

The treatment of dyspepsia is to some extent obvious from the foregoing analysis of its causation. In general terms, the first line in treatment is to deal with organic disease and treat the dyspepsia symptomatically. It should be remembered, however, that when organic disease and dyspepsia are present in the same body, the former may not be the cause of the latter. Care must be taken by a review of the case to establish, if possible, a causal connection. Dyspepsia may, in fact, persist after removal of a chronic appendix, or after the removal of an abnormal gall bladder. In doubtful cases it is often advisable before embarking on surgical treatment to correct functional disturbance, and restore so far as is possible every organ to normal working. This applies especially to intestinal activity and defæcation. At the same time the patient is advised as to alteration of such habits of life, and eating and drinking as may be causing or aggravating his symptoms. By detailed treatment on these lines, if successful, it is surprising how often emotional strain and nervous exhaustion are relieved, and even a psycho-neurotic basis may be resolved. In other cases, where the psycho-neurosis is the determining factor, the doctor may have to decide between a surgical and psycho-therapeutic approach. It is not uncommon for the patient to make the decision and himself to ask, for instance, for the removal of a suspected appendix. Whether or not the organ in question is the cause of the dyspepsia, its removal may have considerable psycho-therapeutic value. It is satisfactory to the patient to feel that a diseased appendix and not his 'nerves' is the cause of his dyspepsia. He may feel to blame for a functional disturbance: he certainly feels it no fault of his that he has organic disease. He gets rest in bed and a pleasant convalescence, and for the

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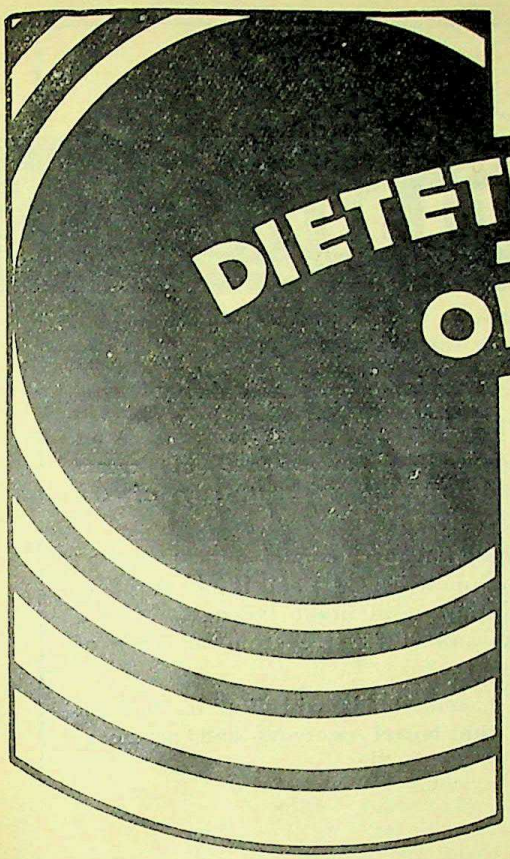

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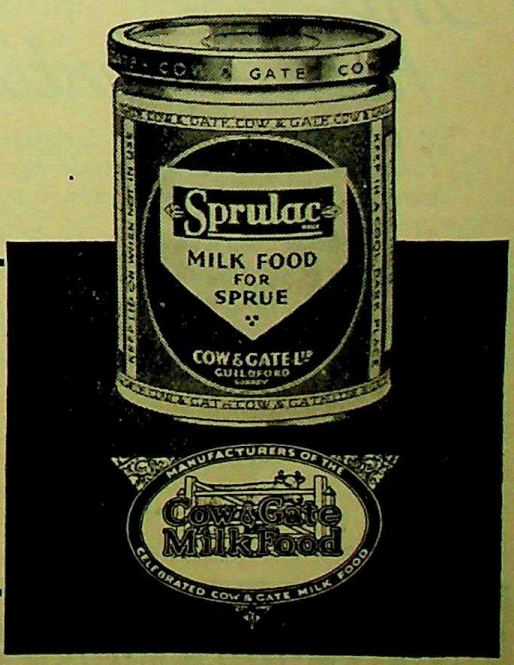

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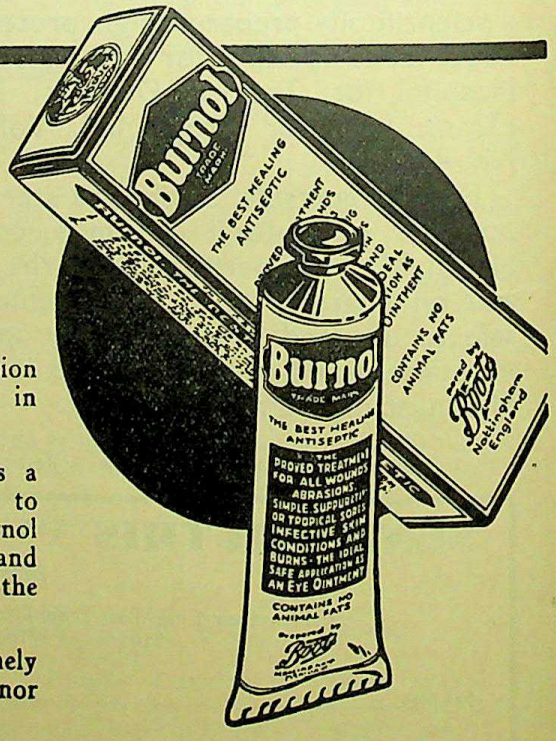

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time that he is under surgical care he is in an atmosphere which is most favourable to emotional calm and recovery of self-confidence.

The Bacteriophage: Its Nature and its Therapeutic Use

By A. P. KRUEGER, M.D.
and
E. J. SCRIBNER, PH.D.

(Abstracted from the *Journal of the American Medical Association,* Vol. CXVI, 17th May, 1941, p. 2269)

1. THE nature of bacteriophage is no longer in question. It is a protein of high molecular weight and appears to be formed from a precursor originating within the bacterium. There is evidence that the precursor likewise is a protein and that it is synthesized by the cell during a phase of accelerated metabolic activity. The process by which the inactive precursor is transformed into active phage is catalyzed by phage; *i.e.,* the primary reaction is:

Inactive phage precursor + phage ——→ phage.

2. For all practical purposes phage production proceeds at a significant rate only when the environment permits bacterial growth and concomitant synthesis of precursor. The most prominent phase of bacteriophagy, massive dissolution of the susceptible bacteria, takes place when enough phage has accumulated to raise the phage/bacteria ratio to the critical lytic threshold.

While phage action *in vitro* is spectacularly effective in bringing about bacterial destruction, bacteriophagy *in vivo* operates on a much less efficient scale and plays a negligible part in the clinical application of phage. There is no substantial evidence that the spontaneous development of phage in the infected host has any bearing on the process of recovery.

Four alternative mechanisms by means of which lysates conceivably may exert a beneficial therapeutic effect include:

(*a*) Phage-induced dissociation of less virulent variants from the original pathogenic invader.

(*b*) Augmentation of phagocytic efficiency through phage action.

(*c*) Stimulation of specific antibacterial immunity in the host by antigenic fractions of lysed organisms.

(*d*) Activation of specific or non-specific immune mechanisms of the host by entirely non-specific elements in the lysate.

The first of these is of little more than possible significance but the last three are unquestionably important and completely outweigh the long overstressed theory that lysis of bacteria *in vivo* is responsible for the clinical successes of phage therapy.

3. The reported data on the use of phage in various diseases caused by bacteria are for the most part insufficient to establish phage therapy as a method of choice. Only rarely have these studies included an adequate bacteriologic background, control groups or careful comparison with accepted therapeutic procedures. There is evidence, however, that a properly prepared lysate can serve satisfactorily as:

(*a*) A vaccine for the treatment of certain diseases, *e.g.,* some types of staphylococcic lesions.

(*b*) An agent for the induction of non-specific protein shock in syndromes in which at times such shock may be used to good purpose, *e.g.,* typhoid.

(*c*) A measure for enhancing the general resistance of an infected area when applied topically. This depends on its non-specific action in mobilizing macrophages and microphages.

It is equally evident that phage solutions possess no measurable degree of superiority over well-known and accepted preparations enployed for the same purposes; for example, bacterial vaccine and toxoid in carbuncles and furunculosis or typhoid vaccine in non-specific protein shock therapy. Modern chemotherapeutic approaches to the treatment of a variety of conditions for which phage has been recommended (cystitis, pyelitis, gonorrhœa, certain bacteremias) offer more chances of success than does phage.

While it has become almost axiomatic to state that the use of phage is entirely innocuous, we have not found this to be the case. The literature provides numerous accounts of reactions ranging from mild to severe following the injection, local application or ingestion of phage, and animal experimental work has shown that lysates may contain enough soluble toxin or Reynal's spreading factor to be actually dangerous.

4. Although it is admittedly very difficult to arrive at definite conclusions regarding the efficacy of any therapeutic agent used for the treatment of certain diseases, the accumulated clinical data on phage are in some instances highly suggestive and warrant the continuation of further studies under thoroughly controlled conditions. This is particularly true of cholera.

Gonorrhœal Urethritis in the Male Treatment with Sulphapyridine and Sulphathiazole

By C. A. W. UHLE, M.D.
L. W. LATOWSKY, M.D.
and
F. KNIGHT, M.D.

(Abstracted from the *Journal of the American Medical Association,* Vol. CXVII, 26th July, 1941, p. 247)

1. SULPHAPYRIDINE and sulphathiazole are equally efficacious in the treatment of gonorrhœal urethritis in the male.

2. Toxicity is manifested less with sulphathiazole than with sulphapyridine.

3. Sulphathiazole is the drug of choice in the treatment of gonorrhœa.

4. It would seem that a combination of oral chemotherapy and local treatment is preferable.

5. Chemotherapy has altered our conceptions of the provocative tests.

6. The value of the culture over the smear should be stressed in pronouncing a patient cured.

7. A social menace is created by the asymptomatic carrier.

Gonococcal Conjunctivitis: A Comparison of Sulphanilamide, Sulphapyridine and Sulphathiazole in the Treatment of One Hundred and Twenty Cases

By P. M. LEWIS, M.D.

(Abstracted from the *Journal of the American Medical Association,* Vol. CXVII, 26th July, 1941, p. 250)

ONE hundred and twenty patients with gonococcal conjunctivitis were treated with the sulphonamides.

Toxic reactions, with the exception of one case early in the series, were practically negligible. Nausea occurred frequently, especially with administration of sulphapyridine. Slight cyanosis was rather common. In very few cases were there any significant changes in the blood cell counts or in the hæmoglobin.

There seems to be no contra-indication to the systemic use of the sulphonamides except a definite history of previous intolerance to the drugs.

Sulphapyridine is amazingly effective in the treatment of gonococcal infections of the eye. Sulphathiazole is apparently somewhat less effective. Both are definitely superior to sulphanilamide. A cure may be expected within three days, as a rule, from the time sulphapyridine treatment is begun.

My limited experience with local treatment by the sulphonamides leads me to the conclusion that it does not compare favourably with the internal use of the drugs. Recently a 5 per cent solution of sodium

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sulphathiazole instilled locally every two hours has been tried along with the usual dose of sulphathiazole internally. Apparently it is of definite value.

Every patient with gonococcal conjunctivitis should immediately be given adequate systemic treatment with sulphapyridine or sulphathiazole.

Reviews

THE BRITISH ENCYCLOPÆDIA OF MEDICAL PRACTICE INCLUDING MEDICINE, SURGERY, OBSTETRICS, GYNÆCOLOGY AND OTHER SPECIAL SUBJECTS. SURVEYS AND ABSTRACTS. 1940. Edited by Sir Humphry Rolleston, Bt., G.C.V.O., K.C.B., M.D., D.Sc., D.C.L., LL.D. 1941. Butterworth and Company (Publishers), Limited, Bell Yard, Temple Bar, London. Pp. xiii plus 596 plus 50. Illustrated. Obtainable from Messrs. Butterworth and Company (India), Ltd., Bombay

THE promise that the *British Encyclopædia of Medical Practice* would be maintained as a living contribution to medical science by the annual publication of supplementary volumes was given in peace time, and nobody could have criticized the editors and publishers had they failed to redeem this promise. Yet they have, and what is more the volumes have been safely delivered in this country.

These supplementary volumes are two, one of reviews and abstracts, the other a cumulative supplement. The latter replaces the previous cumulative supplement and the previous 170 pages have now increased to 283; the former makes a permanent addition to the encyclopædia, of which there are now 15 volumes, the original 12, the general index, and 2 annual volumes of reviews and abstracts. This last volume is infinitely better than its predecessor on which we commented that the writers seemed a little uncertain what was expected of them.

The first part consists of 16 critical surveys of medicine, surgery, gynæcology and the specialties under separate headings. The writers' authority is usually unimpeachable but the subjects have been dealt with so summarily that the value of the reviews is often impaired, and we feel that the editor might be a little more generous in his allotment of space. There is one article, excellent though it is, which seems to be entirely out of place, as it deals with a specific disease, namely, tick-bite fever.

The second part is on 'recent advances in drug therapy'. This means, vitamins—4 pages, sex hormones, almost entirely synthetic—1 page, sulphonamide compounds—2½ pages, and the rest—2 pages. This reflects modern trends.

The third part of the book is devoted to abstracts of medical literature arranged alphabetically and more or less under the headings of the original articles in the *British Encyclopædia of Medical Practice*. These are well selected, and accurately and concisely presented.

The publishers and editors have more than kept their promise of keeping this book alive, and they have done it under what must have been very difficult circumstances.

SURGERY OF MODERN WARFARE. PART V.—Edited by Hamilton Bailey, F.R.C.S. Section IX (continued). Wounds of the Face and Neck including those of the Special Senses. Section X:—Wounds of the Central Nervous System and its coverings. Section XI:—Surgical Diseases encountered in Subtropical Countries. Section XII:—Administration. Section XIII:—Appendix. 1941. Complete in five parts. E. and S. Livingstone, Edinburgh. Pp. from 641 to 876. Illustrated. Price, 17s. 6d. Postage, 7d.

THIS very important war book has now reached its last part. Section IX, on wounds of the face and neck, is concluded. Section X is on wounds of the central nervous system and its coverings. It is an important section consisting of four chapters, including one on the management of the bladder in spinal injuries.

Section XI is a most surprising one to encounter in a book on war surgery. It is entitled 'Surgical Diseases encountered in Subtropical Countries'! We cannot entirely blame the author of the section, except that one assumes he could have refused the invitation to write on subjects that he obviously knows little about and which haven't the slightest claim to being considered surgical diseases. All went well at first, amœbic hepatitis and liver abscess are certainly the surgeon's field, and there is a distinct surgical aspect to filariasis. Bacillary dysentery, when it becomes chronic ulcerative colitis, may also come within the surgeon's scope, but its surgical treatment is well within the bounds of non-tropical surgery and it isn't war surgery in any sense. Schistosomiasis also has its surgical aspect but only the medical treatment is described and it is recommended that the surgical treatment 'is conducted on general principles'. Oriental sore again can be treated surgically but this treatment is not described though it is mentioned. Then comes kala-azar, with a most garbled and inaccurate version of the disease but without any indication of why it is supposed to come within the purview of the surgeon; this paragraph is illustrated by a photograph of a case of Egyptian splenomegaly! The section ends with a short description of yaws, and, believe it or not, cholera.

The next section is labelled 'Administration'. It is an essentially practical one. The chapters are on the stretcher case, wounds in naval action, the organization of a field ambulance, the transportation of the wounded, and the organization of a first-aid post.

Finally comes the appendix. This has a dual function—to give new information that has only come to hand since the earlier parts of book were completed so that it could not be included in its proper place, and to correct existing sections, because the weight of opinion is against the statements made, or because subsequent experience has necessitated their modification or contradiction.

This unique war book has now been completed and, although much that has been included will need more correction and modification than even this last part has provided, it is better to have a book of this kind, with all its defects, now rather than after this war when we hope that the medical profession will have little further use for at least 90 per cent of it.

THE SCIENCE AND PRACTICE OF SURGERY.—By W. H. C. Romanis, M.A., M.B., M.Ch. (Cantab.), F.R.C.S. (Eng.), F.R.S. (Edin.), and Philip H. Mitchiner, C.B.E., T.D., M.D., M.S. (Lond.), F.R.C.S. (Eng.). Seventh Edition. 1941. Volume I:—General Surgery. Volume II:—Regional Surgery. J. and A. Churchill, Limited, London. Volume I:—Pp. x plus 819 plus 76 (Index). Illustrated. Volume II:—Pp. x plus 981 plus 76 (Index). Illustrated. Price, 15s. each volume

The Science and Practice of Surgery is a relative new-comer among the standard textbooks of surgery in England, as its first edition appeared in 1927. The reviewer, having used the first edition in his student days, can remember that it was received with enthusiasm not unmixed with criticism. It is satisfactory, therefore, to renew acquaintance with the book in its present form and to see how much improvement has been achieved since fourteen years ago.

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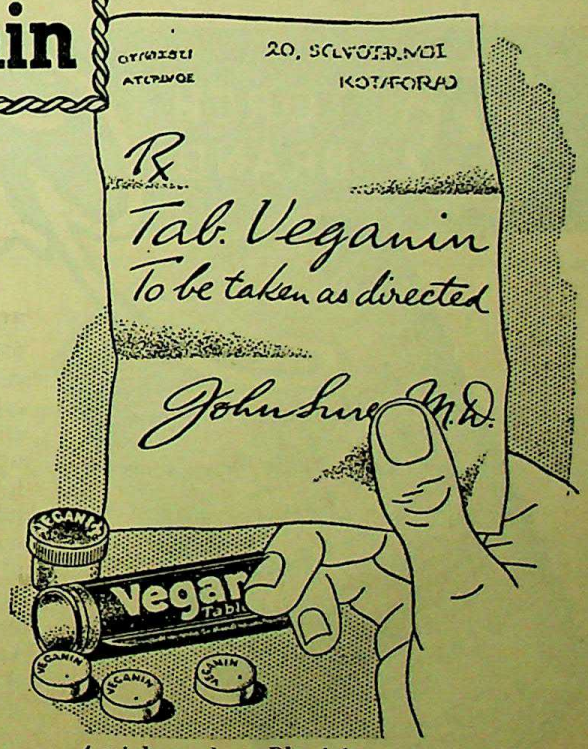

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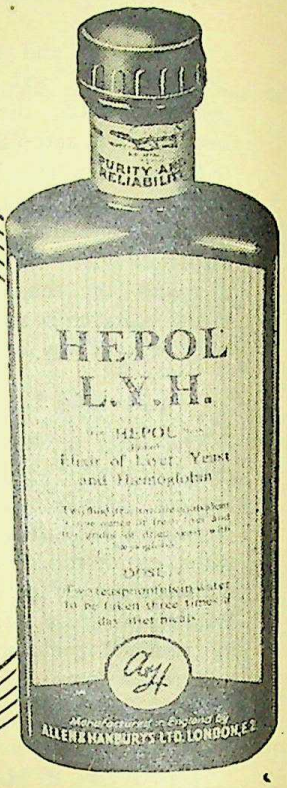

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The book is in two volumes, the first on general surgery, and the second on regional surgery. The first volume describes, in the customary manner, general surgical procedures, surgical pathology, injuries and orthopædics. It winds up with chapters on *x*-rays, anæsthesia, and an appendix on war surgery. A feature of this edition is the curtailment of the section on bacteriology to mere five pages. There are points both for as well as against the inclusion of bacteriology in an elementary surgical textbook. Since the first volume is considerably smaller than the second, perhaps it will be found possible to do more justice to this subject in a future edition.

The chapter on specific infections contains an excellent section on syphilis and its treatment, and also quite a comprehensive account of tropical surgical diseases. In the chapter on burns and scalds is to be found a photograph of a patient with burns of the face treated by tannic acid spray and with his fingers covered with tannic acid compresses. This must have been left in by accident because it is directly contrary to the present consensus of opinion, and not in keeping with the rest of the article, which is sufficiently up to date to mention Bunyan's silk envelope technique.

Volume two describes regional surgery, and in it every important subject has its fair share of space. The chapters on subjects such as the eye, ear, nose, and throat have been written by specialist contributors and have all been carefully revised and brought up to date in keeping with the main part of the work. Although this edition is a wartime production, its printing, paper and binding are in no way inferior to those of its predecessors, and it is still sold at a gratifyingly cheap price.

W. McN. N.

GYNÆCOLOGICAL OPERATIONS.—By J. Lyle Cameron, M.D., F.R.C.S. (Eng.), F.A.C.S., M.R.C.O.G. 1941. Oxford University Press, London, Humphrey Milford. Pp. 200. Illustrated. Price, 21s. Obtainable from Oxford University Press, Bombay and Calcutta

THIS book is a collection of the usual gynæcological operations which are to be found described in the various textbooks.

While it is no doubt of advantage to be in possession of a volume which contains all these operations, yet there is nothing new in this book nor does it contain anything of special recommendation. It commences with a description of the usual incisions, and preparation of the patient. Then vulval, vaginal, cervical, and abdominal operations are dealt with in turn, and the usual methods described.

The author takes the opportunity to go fully into some of the lesser known plastic operations, such as making a vagina for atresia or absence of that organ, but on the other hand is reticent about more usual procedures, such as transplantation of ureters into the pelvic colon in cases of inoperative vesico-vaginal fistula. Indeed the whole treatment of this condition is described in little over one page.

For quick reference to refresh one's memory, this book will be useful, but it cannot take the place of the larger textbooks.

H. E. M.

DISEASES OF THE NERVOUS SYSTEM: DESCRIBED FOR PRACTITIONERS AND STUDENTS.—By F. M. R. Walshe, O.B.E., M.D., D.Sc., F.R.C.P. (Lond.), Hon. D.Sc., Nat. Univ., Ireland. Second Edition. 1941. E. and S. Livingstone, Edinburgh. Pp. xvi plus 325. Illustrated. Price, 12s. 6d. Postage: Inland, 7d.; Abroad, 1s.

THE reviewer has hardly been able to keep the first edition of this book at hand more than a month at a time since it was published last year, as it was repeatedly borrowed by his friends. Now, with the publication of the second edition he has been made to part with the first.

It is not hard to understand why this book has become so popular among medical students. Within the pages of a single volume of modest size are to be found the principles of neurology described in very simple language.

The changes that have been made in the present edition are not many, and perhaps would not have called for a new edition had the previous one not been exhausted, in less than a year's time.

Nevertheless, the text-matter has been increased by about forty pages, and a number of illustrations, including a few on art paper, have been added, but the price is not increased.

Considering the favourable reception given to the first edition, it is obvious that the book will continue to be useful to the wide circle of readers for whom it is intended.

R. C.

TEXTBOOK OF HISTOLOGY FOR MEDICAL STUDENTS.—By Evelyn E. Hewer, D.Sc. (Lond.). Second Edition. 1941. William Heinemann (Medical Books), Limited, London. Pp. xi plus 364. Illustrated. Price, 17s. 6d.

THIS is the second edition of Hewer's textbook on histology. The first edition which appeared in 1937 has been twice reprinted since then. This speaks of the popularity of this book. To a medical student the study of histology might appear very dry and uninteresting, if he is told to focus his attention on the cellular structure only, but if he is given any idea of the immensely complex and mysterious functions that these minute microscopical elements of the animal body are capable of performing, he finds a living interest in the study of histology. This important fact has been well realized by the authoress and she had given prominence to physiological changes of tissue cells. The book is richly illustrated which is of course very desirable in every book of histology. The diagrams are excellent and very illustrative, but I have to offer some criticism with regard to the photomicrographs; many of these are too dark in print (figures no. 130, pp. 148, no. 204, pp. 223 and no. 130, pp. 148). The result is that details have not been shown very well. This book is intended for the beginners to whom the subject should be presented with as much attraction as possible. Barring this minor defect, this volume of histology is very valuable for the students and teachers of the subject.

B. P. T.

Abstracts from Reports

THE ROSS INSTITUTE OF TROPICAL HYGIENE. INDIA BRANCH. REPORT OF THE COMMITTEE OF CONTROL FOR THE YEAR ENDED 31ST JULY, 1941

THIS is the second report of this organization since a local committee of the Ross Institute was founded in Calcutta.

It gives a record of widespread and valuable work principally in malarial control, but other public health measures have also received some attention. The report is mainly composed of abstracts from the reports of numerous tea estate medical officers in which figures play the most prominent part, therefore it does not lend itself to abstraction.

The function of this branch of the Ross Institute appears to be of general supervisory character under their technical adviser Dr. Ramsay, but most of the actual work is carried out by individual medical officers and it is not a charge on the funds subscribed to the branch.

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ANNUAL REPORT ON THE BERRY-WHITE MEDICAL SCHOOL, DIBRUGARH, FOR THE YEAR 1940–41. BY LIEUT.-COLONEL A. M. V. HESTERLOW, M.B., Ch.B. (EDIN.), B.Sc., P.H. (EDIN.), D.T.M.&H. (EDIN.), I.M.S., INSPECTOR-GENERAL OF CIVIL HOSPITALS, ASSAM

DURING the year the Medical School worked satisfactorily. The changes in the staff did not have any disturbing influence on the steady work of the school. The percentage of attendance, however, is 83.62 against 81.93 in the previous year. While this is an improvement, it cannot be looked upon as satisfactory, when it is considered that the students live in a hostel attached to the school. There is nothing in the report to indicate to what this low percentage of attendance may be due. It may be due to illness, which would have to be rather frequent or prolonged to give such a poor attendance, or it might be due to a certain lack of control in the hostel.

There appears to be no medical inspection of the students such as obtains in some of the other Government Colleges in Assam. It would be a very important matter to establish a regular medical and physical inspection of the students in the Medical School, for apart from being a great aid in the preservation of the health of the students it would be a very great asset on the teaching side of the school for making exact observations on the effects of specialized education of a rather exacting nature on young adults, for accumulating data on these problems and for working out under the best auspices practical methods of dealing with the problem of medical inspection of schools as a whole.

There should be a considerable improvement in the teaching of hygiene and vaccination. As an indication of apparent lack of appreciation of the importance of these subjects is the fact that the students of the class do not have any practical training in vaccination. This should be remedied and the students themselves should be obliged to perform a certain number of primary vaccinations and to observe and report on the results. The Dibrugarh Municipal area will provide the most natural field for the development of this improvement. The teacher in these subjects has no public health qualification. It is essential that the teacher in hygiene and vaccination should have such a qualification.

The necessity for a hostel for the women students has become more urgent than ever on account of the decision to admit four women students each year. The renting of private buildings will never provide the convenience and advantages which a college hostel built for the purpose undoubtedly has. It is the provision of hostels in the medical schools in the country and the obligatory residence of the students in these hostels that has been the salvation of medical school education, and the development and maintenance of the high standard this education has reached in so many parts of the country. As the need for the preservation of the health of the women of the land becomes more and more appreciated, women doctors in their training should not be placed under the handicap of their not having the advantages of a hostel of their own, for only in this way can be developed the self-reliance and co-operative effort and co-ordination which are essential for any body of medical practitioners and more particularly for women doctors in the pioneering work that they have to do.

ANNUAL REPORT ON MEDICAL DEPARTMENT OF THE GREAT INDIAN PENINSULA RAILWAY, BYCULLA, BOMBAY, FOR THE YEAR 1940–41

Malaria.—The average number of certified days of absence on account of malaria and other fevers per employee per year was 3.37 as compared with 3.47 for the last year. The incidence of malaria increased from July attaining its maximum in October (1,095 cases) after which it declined to a minimum in March (513 cases).

Influenza.—Influenza was prevalent throughout the year with a maximum incidence in October (984 cases) and minimum in June (485 cases). The number of cases reported was 8,411 with 12 deaths as compared with 8,709 cases with 10 deaths in 1939–40. The percentage incidence of influenza was 9.8 against 11.04 per cent last year. Of the cases treated, 81 were in-patients and 8,330 out-patients. The case mortality was 1.42 per 1,000 against 1.15 last year, and the average monthly incidence was 700.9 cases. Amongst families, 3,708 cases of influenza were treated. No deaths were reported. During the last year, 4,457 cases were treated with two deaths. Of the cases treated this year six were in-patients.

Venereal diseases.—One thousand and twenty-two cases were registered against 966 cases in the previous year. Of these 497 were gonococcal, 107 soft sore and 418 syphilitic infections. The returns for families show 122 cases treated against 122 cases treated last year. Of these, 41 were gonorrhœa, 5 soft sore, and 76 syphilitic infections, the corresponding figures for these for the last year being 39, 6 and 67 respectively.

Enteric fever.—Cases of enteric amongst the employees numbered 72 with 3 deaths against 59 cases with 6 deaths last year. The case mortality was 4.1 per cent of the total cases treated.

Tuberculosis of the lungs.—The number of employees treated for tuberculosis of the lungs was 156 with 20 deaths against 142 cases with 20 deaths last year. These cases are not generally fit for continued employment, and the majority are invalided out of the service. Selected cases are sent to sanatoria with the help of monetary grants from the Staff Benefit Fund and eventually return to useful work. The prolonged periods of sick leave of these cases materially influence the sick rate figures. There can be no doubt that tuberculosis is more frequently met amongst the staff than it was a few years ago. Most of the cases are pulmonary, and in view of its insidious nature and the prolonged invalidism associated with it, it may be advisable in the near future to take special precautions in the examination of recruits by *x*-ray screening. Pulmonary tuberculosis carries a high death rate, *viz*, 20 out of 156 or 12.8 per cent of the total cases treated.

Injuries.—Compared with the figure for the last year, there is an increase of 1,467 or 8.1 per cent. Of these injuries, 13,786 occurred while on duty and the balance, *viz*, 4,253, off duty. The number of deaths reported this year is 11 against 8 in the previous year.

Certified days of absence.—The number of certified days of absence due to injuries sustained on and off duty amounted to 116,444 which, compared with last year, shows a decrease by 11,085 days. Accidents are responsible for 13.55 per cent of the number of days lost on account of sickness during the year. Out of the figure only 10.98 per cent is attributable to injuries on duty. The average number of days of absence per employee per year was 1.35 against 1.62 last year.

REPORT ON THE WORKING OF THE PUNJAB MENTAL HOSPITAL, LAHORE, FOR THE YEAR 1940

THE provision of additional accommodation, both in the male and female section of the hospital, has resulted in an increase in admissions and in the number of cases treated. The total number of patients admitted, including re-admissions, during the year under report, was 331 (274 males and 57 females) against 262 (230 males and 32 females) in 1939—an increase of 69. The total number of patients treated in the hospital in 1940 was 1,366 (1,094 males and 272 females) compared with 1,299 (1,055 males and 244 females) in the preceding year. There was a corresponding increase in the daily average strength which rose from 1,037.65 in 1939 to 1,090.84 in the year under review. The maximum number of patients under treatment on any one night was 1,151 (921 males and 230 females) against

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INDIAN RESEARCH FUND ASSOCIATION RESEARCH FELLOWSHIPS.

1. Applications are invited for five Research Fellowships under the Indian Research Fund Association of the value of Rs. 150 per month each.

2. The fellowships are open to men and women and will be tenable for a period of two years, subject to a satisfactory probationary period of six months. No grant will be given beyond the fellowship of Rs. 150. The award of a fellowship carries with it no guarantee of employment under the Association when the fellowship is ended.

3. Applicants must be Graduates in Medicine possessing a qualification included in the Schedules of the Medical Council of India. They must undertake to work wholetime and will be debarred from private practice.

4. The fellowships are intended to encourage young medical graduates who have already shown initiative and are considered suitable to undertake independent research. Candidates must submit a definite scheme of investigation to be carried out and must produce evidence of their capacity to pursue it with advantage. Applications from candidates who desire only elementary grounding or to carry out an academic course will not be considered. In awarding a fellowship the Governing Body will require to be satisfied that the proposed scheme of work relates to a problem which can be investigated with special advantage to conditions in India.

5. Applications, accompanied by twenty copies of the proposed scheme of investigation, must be forwarded through the Principal or Dean of a Medical College or the Director of a Laboratory or an Institute who should state what facilities are available for the research. The forwarding authority will have to guarantee that guidance and facilities, including contingent expenses, will be available for the particular line of work.

6. Candidates will be required to furnish the following additional information in their applications:—

(*a*) Full name. (*c*) Sex.
(*b*) Age. (*d*) Permanent address.
(*e*) Details of academic career.

7. Applications, which must be typed, should be addressed to the **Secretary, Indian Research Fund Association, Secretariat, New Delhi,** so as to reach him not later than the 7th February, 1942.

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1,058 (843 males and 215 females) in the previous year. The capacity of the hospital, computed at a minimum of 70 square feet per patient, is 1,408 patients (males 1,126 and females 282). The additional accommodation includes three new barracks capable of taking 300 patients in the male section and a double-storeyed block for 100 patients in the female section of the hospital.

The health statistics reveal an all-round improvement. The daily average number of sick during the year under report was 40.06 compared with 63.06 in 1939. The total number of deaths in the hospital was 31 against 47 in the previous year. The death rate was 2.84 per cent on the daily average strength and 2.42 on the new admissions in 1940 compared with 4.52 and 5.72, respectively, in the preceding year. The death rate would have been still lower but for an unfortunate outbreak of colitis—due to food poisoning—in the female section. This cause accounted for 5 deaths. Pneumonia claimed the largest number of victims—6 deaths. There was no case of suicide or escape, although a considerable amount of freedom was afforded to patients. There was one case of assault, in which one convict (who had almost recovered from insanity and was shortly to be transferred to a jail to undergo the unexpired portion of imprisonment) attacked another criminal patient with fatal results. The attack was prompted by a personal grudge.

The cost of maintenance per patient recoverable from ordinary paying patients and other provinces was raised from Rs. 20 to Rs. 25 per mensem with effect from 1st January, 1940, and is stated to be sufficient for covering the expenditure that has to be incurred.

REPORT OF THE EUROPEAN MENTAL HOSPITAL AT RANCHI FOR THE PERIOD 1ST JANUARY, 1940, TO 31ST MARCH, 1941. BY MAJOR MOORE TAYLOR, O.B.E., M.D., D.P.H., I.M.S., MEDICAL SUPERINTENDENT

THE Government of India was pleased to accept the proposal of the Board of Trustees that, subject to certain conditions, ten beds be made available for Indian paying patients of European habits. Nine male Indian patients were treated during the period under report, four of whom were voluntary boarders. There were three in hospital at the close of the year.

The number of patients resident in the hospital at the commencement of the period under report was 251 (males 112, females 139) as compared with 253 (males 117, females 136) in 1939.

There was no outbreak of an epidemic nature, and the general health throughout the period under report was satisfactory. The daily average of sick treated in the hospital infirmary was 3.5 per cent of the population, as compared with 3.2 per cent in 1939. The most distinctive causes for admission were, malaria, influenza (mild), debility, filariasis, fracture, abscess and other septic conditions.

During the period under report three female patients were allowed by the Board of Visitors leave of absence from the hospital for a period of two months. In two cases reports were received at the end of the periods that the patients were well, and they were discharged from the hospital, being shown in the statistics as 'improved', and one patient returned to the hospital.

Treatment.—The condition of every patient on admission is thoroughly investigated, the routine consisting of a complete physical, pathological and psychological examination. This is followed by dental, ear, nose and throat, and, where indicated, ophthalmic examination. Thereafter treatment is prescribed, and all patients are given the benefit of whatever special treatment is indicated. The treatments now in common use are cardiazol shock therapy, prolonged narcosis, malariotherapy, pyrectotherapy, hydrotherapy, occupational therapy, in addition to whatever physical, medicinal or endocrine therapy may be called for in individual cases. Shock therapy is expensive, highly specialized and takes three or four months to complete in any one case, but its results are encouraging. It offers the only hope of cure or amelioration in certain cases of schizophrenia. In spite of the difficulties and dangers of the treatment it has justified itself as a form of therapy. Treatment by prolonged narcosis is found particularly useful in states of excitement and especially in the manic-depressive psychoses. Hydrotherapy is an important form of treatment in many types of mental disorder and is used extensively in this hospital. The detailed technique of all methods of treatment has been dealt with in previous annual reports of the hospital, and repetition is, therefore, unnecessary.

Mrs. Emslie Hutton, M.D., Honorary Physician, the British Hospital for Mental and Nervous Disorders, London, paid a visit to the hospital in September 1940. Dr. Hutton's note on the hospital will, no doubt, be of interest to contributing Governments. It is as follows:—

'I journeyed to Ranchi to visit this Mental Hospital, but never expected to see one so nearly ideal. In fact, of all the Psychiatric Clinics that I have seen in Europe and America, this one combines the most good features and fine principles in its management.

I was greatly impressed by the humanitarian and kindly atmosphere which pervades the place, and by the real hospitalization of the patients. They have the benefit of individual attention by the medical staff (it is a pity there is no woman physician on the staff), and of skilled mental nursing by women. The building lends itself well to real hospital treatment with its spacious verandahs and wards, its wide lawns and gardens and its general air of hopefulness and normality.

It was splendid to see that there were no locked doors and that there were a number of small cottages and garden rooms, each arranged to house one or two patients; these two features might be copied by all mental hospitals with great benefit and comfort to the patients.

The medical treatment is on modern lines, and here new treatments are investigated, tried out, and those which are beneficial are retained. Tradition, too, evidently means something here, and it was pleasant to note the naming of the various blocks.

The routine, with its daily community singing, exercises and occupational therapy, its regular games, dancing, concerts and cinemas, is highly organized and most interesting. It is a great advantage that there is a music mistress and a physical instructor on the staff.

The hospital might well serve as a model for others in India and elsewhere. It was a great pleasure to see this very excellent and modern clinic, and it is to be hoped that many doctors and members of the general public may be able to make the journey to see it and so obtain, as I did, inspiration from much that I saw.'

Occupational therapy continues to be one of the main features of the hospital. The average number of patients employed in useful tasks in the hospital represents over 80 per cent of the population. All nursing sisters are now fully qualified to supervise this treatment, either in the Occupational Therapy Department or in the wards. Most of the articles made in the department are utilized in the hospital, but any surplus stock is sold to the public. During the period under report the total sales to the public from this department amounted to Rs. 1,264. The sales during 1939 amounted to Rs. 820.

Diversion.—Classes in physical drill, folk-dancing and games are held daily, and the patients, assisted by the staff, staged a number of excellent concerts during the year. Parties attended the cinema at the Indian Mental Hospital when English films were being shown. The social evenings and dances continue, and a full Christmas programme was brought to a close with the usual fancy dress ball. The cricket, football, and hockey teams played a number of friendly matches on the hospital grounds, and also at Ranchi, some of which they won.

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Service Notes

APPOINTMENTS AND TRANSFERS

SURGEON-COMMANDER G. W. MILLER, Principal Medical Officer, Royal Indian Navy, is appointed to carry on the duties of the post of Port Health Officer, Bombay, in addition to his own duties, *vice* Major Bozman, granted leave, until further orders.

Major R. I. Reid is appointed Director of Production Instruments and Appliances, in the office of the Director-General, Indian Medical Service, with effect from the 19th July, 1941.

Major A. A. Pullar, Presidency Surgeon, Bombay, is appointed Honorary Surgeon to His Excellency the Governor of Bombay, with effect from the 3rd November, 1941, in addition to his own duties.

Major F. R. W. K. Allen, Superintendent, Central Jail, Jubbulpore, is reverted to the Medical Department and posted as Civil Surgeon, Raipur. He made over charge at Jubbulpore on the forenoon of 30th October, 1941, and assumed charge at Raipur on 6th November, 1941 (forenoon).

INDIAN LAND FORCES

(Permanent Commission)

To be Captain (on probation)

Vishwanath Prasad Gupta. Dated 15th November, 1941, with seniority 15th November, 1936.

(Emergency Commissions)

To be Captains (on probation)

2nd June, 1941

Piyare Lal Burman, with seniority from 2nd June, 1935.

5th July, 1941

Krishna Chandra Varma, with seniority from 5th July, 1934.

6th July, 1941

Louis Oswald, with seniority from 19th July, 1934.

19th July, 1941

Mool Singh Bazaz, with seniority from 19th July, 1938.

3rd August, 1941

Phanindra Krishna Gupta, with seniority from 1st April, 1936.

To be Lieutenants

26th December, 1940

Peter Anthony Lane Roberts.
Edward George William Lynch.

13th March, 1941

Colin Monroe Bisset.

27th March, 1941

Howard Raymond Cara.
William Leslie Percival Spicer.

12th June, 1941

Edward Dunsky.

To be Lieutenants (on probation)

5th July, 1941

Bishamber Nath Blaggan.
Boddapati Amrit Rao.
Hans Raj Nischol.
Ramah Sukumaran.
Vasudeva Krishna Row.
Ramesh Chandra Biswas.
Jonnalagadda Surya Prakasa Rao.
Brij Ballabh Prasad.
Kundan Singh Gill.
Jiban Krishna Sarkar.
Gopal Ganesh Sahasrabudhe.
Vasudeo Anant Mauskar.
Muddassin Khan.
Rabindra Nath Sen.
Shiv Dev Singh.
Chhajju Ram Abrol.
Uttam Singh Sidhu.
Gurditta Mal Diwan.
Pargat Singh.
Krishan Gopal Bhatia.
Rabindra Nath Gupta.
Rustom Sohrab Tata.
Nellorepalle Venkata Subrahmanyam.
Revur Krishnamurti.
Arumugam Pillai Thiagarajan.
Cortielle Madhavan Nair.
Rajanga Nataraja Aiyer.
Viswanatha Sankaran.
Iftakhar Jahan.
Charlie Lachlan Joshee.
Balai Lal Roy Chowdhury.
Anil Kumar Bose.
Yeshwant Govind Joshi.
Duraiswami Jayaram.
Lekshumana Rajagopala Marthandam.
Mayavaram Venkatarama Ramachandran.
Chambathil Ramanunny Mannadiar.
Kandukur Prabhakaram.
Dady Framji Vachha.
Mukkai Subramania Mahadevan.
Arcot Govindaraj Rangaraj.
Reginald Anthony Jansen.
Palathiruthi Achutha Menon.
Noble Adiseshiah.
Tindivanam Ramanujam Muthurangam.
Tanjore Daivasikhamani Gowri Sankar.
Sardari Lal Bhandari.

INDIAN MEDICAL SERVICE (DENTAL BRANCH)

(Emergency Commissions)

To be Lieutenants (on probation)

5th July, 1941

Sheikh Fazle Ilahi.
Ram Pratab.
Mulk Raj.
Vidya Sagar Sehgal.
Jai Ram Das Ahuja.
Mohammed Shafique.

6th July, 1941

Walter Joseph Siqueira.
Pratibha Ranjan Dutt.
Mohan Hatangdi.
Gobinda Prasad Halder.
Raghunath Singh Hoon.
Mammen Mammen.
Chirayath Francis Varied.
Narayan Prasad Mahapatra.

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7th July, 1941

Guruswami Audikesavalu Naidu.

10th July, 1941

Rishiyur Sundaram Thyaga Rajan.

5th August, 1941

Phiroze Jehangirji Engineer.
Panakkal Othuppu Ittooppunny.
Thakar Das Narang.
Sardari Lal Kalra.
Bhag Singh.
Vepa Purna Rao.
Allen Arthur Rawat.
Profulla Chandra Sen.
Lakshminarayanapuram Krishna Ayyar Anantanarayanan.
Agha Fakhar Hussain.
Rai Sahib Lakshman Prasad Misra.
Narayan Gangadhar Chitnis.
Thiruvengadham Pillai Durairaj.
Charu Bhavanishankar Bhargav.
Vinay Bhavanishankar Bhargav.
Isfendiyar Khan.
Tadimalla Rama Seshagiri Row.
Fakir Chandra Mukherjee.
Jal Hormajshaw Chibber.
Gopal Laxman Chitale Bhajekar.

6th August, 1941

Devki Nandan Mehta.
Gursewak Singh Sidhu.
Binaya Krishna Bhattacharyya.
Gauri Shankar Singh.
Manmatha Nath Ghosh.
Mafizuddin Talukdar.

5th September, 1941

Lalgudi Annadurai Venkataraman.
Balwant Singh Sachdev.
Ashiq Hussain.
Vadarangam Swaminadha Mahadevan.
Jyotish Chandra Ghosh.
Tattamangalam Subramaniapattar Viswanathan.
John John Eapen.
Abdul Kadeer.
Madan Lal Madan.
Perinbam Thanaratnam.
Charanjit Singh Mehdiratta.
Tulsi Charan Bose.
Panthalingal Krishna Menon.
Dilbagh Rai Mendiratta.
Sabodh Kumar Rana.
Nuruddin.
Jagjit Singh.
Jagannath Anantrao Sonde.
Shrikrishna Shridhar Godbole.
Konat Narayanan Pillai Sankara Pillai.
Duvoor Jagannatha Reddy.
Mahmood Ali Khan.
Vasudeo Balakrishna Kale.
Alacandy Raghavan.
Gondi Herbert Samuel David.
Poosapati Raghunadharaju.
Mathura Prasad Varma.
Natarajan Venkataraman.
Natarajier Krishnaswami.

6th September, 1941

Prafullah Kumar Ray.
Amarendra Kumar Daw.
Chintaman Shringapure Ramchandra.
Binay Kumar Nandy.
Benoy Krishna Bose.
Syed Ghaus Mohammad Shah.
Mohammad Khurshid Akhtar.
Chaudhri Khurshid Hasan.
Shreedhar Shreenivas Kirtane.
Sadashiv Mahadev Apte.

LEAVE

Major C. A. Bozman, Port Health Officer, Bombay, is granted leave on average pay for 3 months, with effect from the afternoon of the 18th October, 1941.

PROMOTIONS

The undermentioned officer is granted the local rank of Brigadier, without effect on pay and pension:—

Colonel R. V. Martin, C.I.E. Dated 1st October, 1941.

Lieutenant-Colonel to be Colonel

W. R. Stewart, C.I.E. Dated 12th July, 1941, with seniority from 31st July, 1936.

Major to be Lieutenant-Colonel

T. A. Doran. Dated 22nd November, 1941.

Note.—The seniority of Captain H. B. Wright in his present rank, notified in a previous Notification, is antedated to 7th May, 1933.

The seniority of Captain S. M. Basu in his present rank is antedated to 4th January, 1937.

(*Emergency Commission*)

Note.—The seniority of Captain C. V. Ramchandani in his present rank is antedated to 24th September, 1935.

The seniority of the undermentioned officers in their present rank is antedated to the dates shown against their names:—

Captain C. L. Bhola. Dated 15th January, 1935.
Captain C. V. Krishnaswami. Dated 17th February, 1938.
Captain R. Kasliwal. Dated 23rd September, 1935.
Captain L. Nandkeelyar. Dated 1st February, 1940.
Captain A. L. Som. Dated 15th July, 1940.
Captain N. Dutt. Dated 1st August, 1940.
Captain S. L. Rikhye. Dated 1st March, 1941.
Captain M. G. Hyder. Dated 19th March, 1941.
Captain M. Said. Dated 23rd March, 1941.

(*Short Service Commissions*)

Note.—The seniority of the undermentioned officers in their present rank is antedated to the dates shown against their names:—

Captain S. A. Mian. Dated 29th October, 1936.
Captain M. S. Rao. Dated 9th December, 1936.
Captain S. A. Hasan. Dated 22nd December, 1936.
Captain V. R. Damle. Dated 29th March, 1937.
Captain P. Dass. Dated 11th June, 1937.
Captain B. Bhattacharjya. Dated 12th July, 1937.
Captain B. I. S. Bhalla. Dated 12th July, 1937.
Captain P. N. Bardhan. Dated 12th July, 1937.
Captain R. L. Mehra. Dated 12th July, 1937.
Captain D. Bhatia. Dated 12th January, 1939.
Captain N. Jungalwalla. Dated 1st February, 1939.
Captain P. C. Dhanda. Dated 22nd June, 1939.
Captain P. T. Joseph. Dated 22nd June, 1939.
Captain H. R. Pasricha. Dated 22nd June, 1939.
Captain M. Sarwar. Dated 22nd June, 1939.
Captain D. K. Bose. Dated 22nd June, 1939.

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Captain N. D. P. Karani. Dated 12th July, 1939.
Captain N. Chakravarti. Dated 22nd December, 1939.

Note.—The seniority of Captain N. A. A. Khan in his present rank is antedated to 23rd September, 1940.

(Emergency Commissions)
Lieutenants to be Captains

15th June, 1941
M. H. Alvi.

15th August, 1941
N. R. Gupta.

15th October, 1941

A. Bhattacharjee.	P. B. Menon.
B. B. Sen Gupta.	A. S. L. Narasimham.
K. B. Sen.	S. A. R. Iyengar.
D. K. Ghoshal.	M. V. Krishnamurthy.
H. Sen Gupta.	I. R. Rao.
B. M. Sinha.	S. Rodrigues.
S. K. Ghose.	S. C. Roy.
S. N. Sinha.	S. C. Ghosh.
C. K. Kesavan.	H. C. Mediratta.
C. S. Krishna Murthi.	R. R. Reddi.
S. K. Choudhury.	S. V. Menon.
K. C. Hazra.	C. Bhadraiah.
M. P. Sarma.	M. M. Hossain.
P. C. Koshy.	V. R. M. Sadasivan.
S. K. Ray.	L. Verghese.
G. Sambasivan.	S. Ghose.
K. K. Nayak.	S. Mukerjee.
B. L. Raina.	S. Kaul.
P. A. Paul.	M. Ramzan.
V. Ranghachari.	Z. A. Choudhuri.

16th October, 1941

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Original Articles

TREATMENT OF CHRONIC INTESTINAL AMŒBIASIS

USE AND ABUSE OF EMETINE

By SIR R. N. CHOPRA, C.I.E., M.A., M.D., SC.D. (Cantab.), F.R.C.P. (Lond.)
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Introduction.—The literature on the use of emetine in the treatment of intestinal amœbiasis is extensive and the general consensus of opinion with regard to it may be summed up as follows :—Firstly, that emetine injections are by far the most satisfactory immediate line of treatment of an acute attack of amœbic dysentery; and, secondly, that emetine therapy is generally a failure in the treatment of chronic intestinal amœbiasis and the carrier condition. Our own experience during the past 20 years confirms these views. This paper is based on 1,105 cases of intestinal amœbiasis treated by the senior author in the Carmichael Hospital for Tropical Diseases.

In India, when amœbic dysentery is diagnosed or even if *Entamœba histolytica* is not discovered and a diagnosis is made on purely clinical grounds, emetine injections are often given immediately and a course of nine injections is prescribed. We have also seen emetine being administered even when the case is evidently not of acute amœbic infection, but belongs to the bacillary variety. The reason for such use is that emetine has got remarkable properties of alleviating the distressing symptoms occurring in acute dysenteric infections of all kinds.

Occurrence of active and cystic forms.—There is also an impression among medical practitioners in this country that, if trophozoites of *E. histolytica* are present, emetine is effective in chronic intestinal amœbiasis. It is believed that when cysts are present emetine is not effective because it has no action on the cysts.

It must be stated here that *E. histolytica* is an obligatory pathogenic organism and lives and multiplies in the tissues of the host. The active stage of the organism outside the body lasts only a few hours. The opinion now held is that when amœbic infection is present there is always ulceration in the gut. In sub-clinical intestinal amœbiasis, where no gut symptoms are present, the ulcers may be very small, pin-point in size, but their presence is considered to be essential for entamœbæ to live and multiply. *E. dispar* is considered to be identical with *E. histolytica*.

The lesions in the gut in histolytica infection are generally in the upper part of the large intestine. In severe infection the lower part (sigmoid) is also affected and sometimes the distal part of the small intestine also has ulcers. Active forms of *E. histolytica* are present in the tissues; cyst formation only takes place when these amœbæ leave the tissues, come into the lumen of the gut and find the environment there unfavourable for their existence. These cysts are resistant forms which can live both in the lumen of the gut for prolonged periods and outside the body also, in damp environments. Dry heat kills them quickly. Encystation generally takes place in the lumen of the large gut where the contents are solidifying. After going through the pre-cystic stage the cystic forms are produced. Both trophozoites and cysts may be present together in chronic amœbiasis. Histolytica infection is often associated in this country with *Entamœba coli, Iodamœba butschlii* and *Endolimax nana; Giardia lamblia* and other flagellates also occur and hookworms, roundworms and threadworms are often associated.

Diagnosis of histolytica infection can be made by examining a fresh stool, but errors in diagnosis are common. No reliance can be placed on suspected non-motile or dead amœbæ in stools. To the practised eye it is not difficult to recognize the *Entamœba histolytica.*

Charcot-Leyden crystals are commoner in chronic amœbic dysentery than in the bacillary form but are not pathognomonic of this condition. Sigmoidoscopic examinations are helpful, and entamœbæ may be found in scrapings from ulcers in long-standing cases. Craig (Musser, 1938) has introduced a complement-fixation test which is somewhat difficult to perform and is not in common use.

In the relapsing type, entamœbæ are sometimes easily found in the stool and the very first examination may reveal them either in active or cystic form. In other cases after repeated examinations the parasites may not be found even after administration of purgatives. This is often the case when the patient has recently undergone treatment with emetine or other amœbicidal remedies. Parasites are sometimes discovered only after more than 10 to 15 daily examinations.

Amœbic infection may persist for many years and in some of our cases had lasted more than 15 years. Periodic relapses may or may not occur. There were periods of quiescence lasting for many years, during which the patients enjoyed good health.

Sub-clinical amœbiasis.—The degree of severity of symptoms in *E. histolytica* infection varies greatly. These differences are due to variations in the resistance of different individuals to the inroads of the parasite, and to the virulence or tissue-attacking power of various strains of the parasite. Further, it should be realized that the influence of environment (the gut) is an important factor. Stasis of the contents plays an important part in determining

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the severity of the symptoms and the type of lesions produced. The degree of pathological change may vary enormously. In quite a large number of cases met with in this country, few or no symptoms associated with intestinal amœbiasis are present, the patient generally seeking advice for some other complaint. We have had patients coming for chronic dyspepsia (flatulence, meteorism, etc.), asthma, dermatitis, urticaria and other skin diseases, low pyrexia, migraine, feeling of tiredness, malaise, etc., in which the cause on investigation was found to be amœbic infection and proper treatment relieved the symptoms completely. There were also cases where no symptoms were present, the individual being apparently in good health. Active and cystic forms may occur without there having been any history of an attack of dysentery.

Why is emetine effective in acute amœbic infection and not in the chronic form?

In acute amœbic infection, the amœbæ are numerous and in full activity, and are amenable to the action of emetine. The reason is that the gut in this condition is in a hyperæmic state and emetine given in the form of injections quickly reaches the amœbæ, which lie in the ulcers, through the blood stream and destroys them. But even here, though injections control the urgent clinical manifestations, in the majority of cases, the infection is often not eradicated. It is now beginning to be realized that emetine after all is not the specific drug in the treatment of amœbiasis that it was imagined to be. Injections, especially of inadequate doses, may produce emetine-resistant forms; this fact is often not appreciated and one often sees cases which have had injections of ¼ or ½ grain daily instead of effective doses of one grain.

In relapsing and chronic types of dysentery and especially in long-standing cases, fibrosis of the ulcerated area is set up and the capillaries are cut off, thus preventing the access to the parasite of emetine circulating in the blood. Entamœbæ lying in the necrotic and fibrotic tissue (which is avascular) are walled in and are thus liable to escape the action of emetine.

The second factor is the infection of the ulcers with intestinal bacteria, which irritate and promote pathological changes and lead to chronicity of the lesions. Further, with such added infection, the reaction of the gut becomes markedly acid and as emetine acts best in an alkaline environment, its action is hindered.

If energetic treatment is not started in the early stages of an acute infection before extensive destruction of tissues has taken place, relapses are almost certain to occur. Such symptoms as tenderness on pressure over the colon (especially the cæcum and the sigmoid), localized abdominal pain and thickening are frequently found. The liver is enlarged and tender when hepatitis is present.

Treatment of relapsing and chronic forms of amœbiasis

In considering the agents available for the treatment of chronic amœbiasis, we must consider not only the relief of symptoms but also the sterilization of carriers, symptom-free or otherwise. In order to get at the entamœbæ one must have an agent which is absorbed and carried by the blood stream to the tissue-invaders and which at the same time is present in the lumen of the gut in adequate quantities to destroy both the non-motile and encysted forms. The drug further should be free from danger or discomfort to the host. Unfortunately no single substance is available which fulfils all these requirements. Yet by judicious and persistent use of one or more drugs, it may be possible to cure a large percentage of cases. It must also be stated that the disease cannot often be eradicated by giving just one or two courses of any remedy. We have found that in long-standing cases the treatment, both dietetic and medicinal, has to be continued for many months. We prescribe nothing less than three to four months' treatment in mild cases and in serious cases a much longer course may be necessary. The usual procedure adopted is as follows :—

The patient is put on a low-residue diet and a proper course of one of the amœbicidal drugs mentioned below (carbarsone, yatren, or kurchi alkaloids) is prescribed. This is followed by liquid extract of kurchi in doses of one to two drachms twice daily after meals for a period of two to three months. There is no doubt that the presence of kurchi alkaloid in the gut is unfavourable to histolytica. In cases where added infection with the dysenteric group of bacteria is present, a ten days' course of lactose in doses of three to four heaped teaspoonsful in a tumbler of water first thing in the morning is prescribed; lactic acid organism in form of *dahi* (curdled milk) or tablets of lactol are given at the same time. Lactose is absorbed sparingly from the gut and its presence there enables the lactic acid-forming organisms to grow and replace other organisms; in this way the intestinal flora is changed. If much mucus is present such drugs as *isapgul* are given. Frequent examinations of stools are made throughout the course to see if trophozoites or cystic forms are present. If these are discovered courses of amœbicidal drugs are repeated. The treatment may have to be continued for many months together.

Five groups of drugs are available in the treatment of chronic amœbiasis :

(1) *Emetine and emetine-bismuth-iodide.*—We have already explained that emetine given by injection does not cure chronic amœbic dysentery. Emetine by the mouth in form of emetine-bismuth-iodide is more effective, as it is absorbed from the gut and reaches the lesions by the capillaries; at the same time a sufficient concentration is maintained in the gut for direct

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action on the parasites present in the ulcers and free in the lumen. Indian patients rarely stand more than two grains a day and the usual practice is to give it for ten consecutive days. The drug is administered in hard gelatine capsules at night before going to bed, three hours after a meal, and even then nausea and vomiting frequently occur. We had to use tincture opii in five to seven minim doses to enable the drug to be retained; according to Manson-Bahr (1941) luminal in doses of one grain is also very effective. Instead of giving two grains at once, it is often advantageous to give one grain repeated at an hour's interval. Emetine-bismuth-iodide, however, has not proved very successful in our hands. A combined treatment with emetine hydrochloride by injection in one-grain doses and emetine-bismuth-iodide in two-grain doses for a period of nine days has been tried.

The only condition in which injections of emetine are specific is amœbic hepatitis with or without abscess formation. A course of injections often acts like a charm and we have had cases in which apparently a large abscess had formed and showed signs of resolution after four or five injections of one grain each. We have also tried the alkaloids by injection and by mouth, as well as other amœbicidal drugs, without any effect whatsoever.

Emetine, however, is a very toxic drug; it has a depressant effect on the heart and nervous system. It is slowly eliminated; so it produces cumulative poisoning. The toxic effects observed are nausea and vomiting, diarrhœa, pronounced depression, both mental and physical, cardiac irregularities and fall of blood pressure. Muscular weakness with pain and tremors, and peripheral neuritis leading to paralysis of different groups of muscles sometimes occurs.

(2) *Quinoline derivatives.*—Yatren, introduced by Bayers, is the oldest member of this group. To this group also belong *chiniofon* which is official in the U.S.P. XI and contains 27 per cent of iodine. The other two substances similar to chiniofon are *vioform* and *diodoquin*. *Vioform,* which contains about 40 per cent of iodine, is not very soluble and is also somewhat irritant and liable to produce toxic effects. Recently another iodine derivative named *diodoquin* has been introduced which contains 64 per cent of iodine. All these compounds are believed to act on both motile and cystic forms. They are recommended in doses of one to two gm. daily for a period of ten days at least; two of them, *i.e.*, yatren and another proprietary preparation enterovioform, have given satisfactory results in our hands. Retention enemata with 200 to 300 c.cm. of a 2.5 per cent solution retained for six to eight hours have been tried but they do not appear to hasten cure.

(3) *Organic arsenicals.*—These consist of stovarsol and carbarsone. The former drug is somewhat toxic and is liable to produce a red urticarial rash; carbarsone, however, in doses of 0.25 gm. twice daily for 15 to 20 consecutive days has been intensively tried by us and has proved effective in our hands; little or no toxic effects have been observed. If the drug is administered with a small dose of salts in the morning to give one or two loose motions, the effectiveness is increased and the toxicity is reduced.

(4) *Kurchi alkaloids.*—The Indian species of *Holarrhena antidysenterica* contain conessine, kurchicine and kurchine. They have been shown to be effective in the treatment of both acute and chronic forms of intestinal amœbiasis. In our hands the bismuthous-iodide compound of the total alkaloids (kurchi-bismuth-iodide) in doses of 10 grains twice daily has given very satisfactory results. These alkaloids have no depressing effects on the heart and have low toxicity. They can, therefore, be administered in large doses and for prolonged periods. We have also found prolonged administration of a standardized liquid alcoholic extract of kurchi in doses of one to two drachms two or three times a day continued for two or three months effective in cases of amœbiasis where infection has existed for many years.

(5) *Palliative remedies.*—The last group of drugs used in the treatment of intestinal amœbiasis are certain palliative remedies, *e.g.*, *Plantago ovata* (isapgul), *Aegles marmelos* (Bael fruit), certain species of *Psylium* (tukhmalong), which are commonly used in this country. Others such as *Acorus calamus*, *Castelloa nicholsoni* are used in America; *Monisernia ovata* and *Rhynocasia adenades* are used in South Africa. Their action is mainly due to two groups of substances which enter into their composition: (1) tannins which have an astringent and soothing effect, but have only a slight toxic effect on the *E. histolytica.* (2) Substances of the nature of mucilage which are contained in the cells of the epidermis. Their action is largely mechanical. They permeate the gut and are an unsuitable medium for the growth of micro-organisms present there; the bacteria are also entangled in their meshes and are passed out. The mucilage covers the surface of the ulcers and thus protects them from the irritating action of the intestinal contents and so promotes healing. This is the explanation why this class of substance has been held in great esteem in the indigenous medicine in India. We have used *Plantago ovata* either as whole seeds or separated pericarp in doses of four to six heaped teaspoonsful two or three times a day for prolonged periods in long-standing cases with extensive ulceration, with good results.

Miscellaneous drugs.—We have tried govano, sulphonamide derivatives, sulphoguanidine and a number of other drugs in chronic amœbiasis with disappointing results.

Summary

Emetine in form of injections has little value in the treatment of the chronic and carrier-forms

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of intestinal amœbiasis. To give a course of injections of emetine in this condition is not only waste but abuse of the drug, as harmful effects may be produced by it. Emetine is a very toxic drug, and the manner in which it is often administered in this country, without confining the patient to bed, has occasionally been followed by serious toxic effects. This alkaloid has not such a specific action in intestinal amœbiasis as was once believed. Further, on account of the war, the supplies of this drug have been considerably reduced, and therefore not only emetine but all preparations of ipecacuanha should be sparingly used.

The chief indications for parenteral emetine therapy are, firstly, acute amœbic dysentery, and, secondly, amœbic hepatitis, with or without abscess formation. Emetine injections are indispensable in this latter condition, as no other drug has so far been discovered which has curative properties in this condition. Even for acute amœbic dysentery the quinoline derivatives, the kurchi alkaloids and carbarsone have in our experience proved to be almost as effective as emetine.

Emetine injections are indicated when acute exacerbations with troublesome symptoms occur in chronic amœbiasis. Three to four injections in doses of one grain daily put an end to the symptoms without producing cumulative toxic effects.

In chronic amœbiasis good results have been obtained with emetine-bismuth-iodide by mouth; one course often does not prove successful and several courses in increasing doses may have to be given. This drug has, however, all the depressing and toxic effects of emetine and in our experience has not proved very satisfactory in Indian patients.

Carbarsone, yatren, enterovioform and kurchi alkaloids have given very satisfactory results.

REFERENCES

MANSON-BAHR, P. (1941). *Brit. Med. J., ii,* 255.

MUSSER, J. H. (1938) .. *Internal Medicine.* Henry Kimpton, London.

BIBLIOGRAPHY

ACTON, H. W., and CHOPRA, R. N. (1933). *Indian Med. Gaz.,* **68,** 6.

BANERJEE, L. M., CHOPRA, R. N., and RAY, P. N. (1936). *Ibid.,* **71,** 693.

CHOPRA, R. N. (1930) .. *Ibid.,* **65,** 428.

Idem (1934) .. *Ibid.,* **69,** 309.

Idem (1936) .. *A Handbook of Tropical Therapeutics.* Art Press, Calcutta.

CHOPRA, R. N., and SEN, B. (1934). *Indian Med. Gaz.,* **69,** 262.

CHOPRA, R. N., SEN, B., and GUPTA, J. C. (1937). *Ibid.,* **72,** 348.

CHOPRA, R. N., SEN, B., and SEN, G. (1935). *Ibid.,* **70,** 324.

CHOPRA, R. N., SEN, B., and SEN, S. (1933). *Ibid.,* **68,** 315.

CHOPRA, R. N., and SEN, S. (1934). *Ibid.,* **69,** 375.

CHOPRA, R. N., SEN, S., and SEN, B. (1934). *Ibid.,* **69,** 130.

GASTRIC ACIDITY IN CHRONIC ULCERATIVE COLITIS

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Introduction

CHRONIC ulcerative colitis frequently occurs amongst Indians and Europeans living in India and a number of patients with this condition are admitted every year to the Carmichael Hospital for Tropical Diseases. Many of these present a symptom-complex pointing to gastric trouble. In 100 such patients in whom the diagnosis was made after a barium meal, sigmoidoscopy, examination of stool, gastric acidity, etc., were also carefully determined. The result obtained in these investigations forms the subject-matter of this paper.

Normal range of gastric acidity

This is believed to be between 20 and 40 c.cm. for Europeans. According to Bell (1922), the range is lower and should not exceed 30 c.cm. Napier with his long experience of Indian subjects demonstrated that the average normal range safely could be considered to be between 25 and 45 c.cm. According to Bhattacharya (1933), for the rice-eating population of Calcutta the range of acidity was rather on the high side. Rao (1937), on analysis of 100 Indian males from South India, observed that the acidity was, on the whole, high amongst them. Napier, Chaudhuri and Rai Chaudhuri (1938) observed that the incidence of high acidity was common among Bengalis who consume rice, and it was relatively low amongst Punjabis who are wheat consumers. This is further corroborated by the fact that peptic ulcer is more frequent amongst the rice-eating South Indian than in the case of the Punjabis who live on wheat.

Laboratory tests

The gastric acidity was determined by alcohol test meals in preference to the gruel meal. Our cases were grouped according to Napier's classification of different ranges of gastric acidity which are as follows :—

Hyperchlorhydria—when the acidity is over 65 c.cm. of N/10 NaOH per 100 c.cm.; *high normal*—where it is over 45 but below 65 c.cm.; *normal*—between 25 and 45 c.cm.; *low normal*—between 10 and 25 c.cm.; *achlorhydria*—complete absence of acidity (HCl).

Examination of 100 cases of chronic ulcerative colitis in our series showed that *hyperchlorhydria* was present in 38 per cent of cases; *high normal* in 29 per cent; *normal* in 17 per cent; *low normal* in 4 per cent and *achlorhydria* in 12 per cent.

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Symptomatology

Apart from the usual signs of colitis, such as slimy bloody stool, alternate constipation and diarrhœa, heaviness and flatulence, two characteristic features of the disease were :—

(1) *Epigastric uneasiness or pain* was present in 35 out of 38 cases of hyperchlorhydria.

(2) *Loss of weight* and feeling of sickness was present in 10 out of 12 cases of achlorhydria.

Radiological findings

The radiological findings of 38 cases of hyperchlorhydria in this series revealed that enlarged stomach with normal motility was present in 33 cases, pyloro-spasm in 21, abnormal duodenal cap in 28 and duodenal ulcer in 1 case. Spasticity of the colon, especially of the descending portion, was found in 32 cases, of transverse portion in 18 and of ascending portion in 7 cases. Hyperchlorhydria was present in all these cases. In all the 12 cases of achlorhydria the stomach was found to be dilated, toneless and ptosed. There was also ptosis of the transverse colon and splenic flexure. The exit of the barium meal was prolonged over 48 hours.

Discussion

The state of gastric acidity of one hundred correctly diagnosed cases of chronic ulcerative colitis has been studied. It was observed that the figures of gastric acidity obtained are definitely higher than those occurring in normal individuals. In 67 per cent of cases the gastric acidity was found to be definitely on the high side. The occurrence of excessive acid secretion in such a large proportion of cases of ulcerative colitis is difficult to interpret. It may be due to the reflex stimulation of the Meissner's plexus in the submucous coat of the stomach during the passage of food materials over the ulcerated surface of the colon. It may also possibly be due to the formation of a histamin-like substance by the proteolytic action of the bacterial flora of the intestine and its absorption into the circulation. The H-substance which is a secretory stimulant both for the peptic and salivary glands would provoke hypersecretion of gastric juice. These are some of the hypotheses which need to be substantiated by further experimental work.

The same difficulty arises in explaining the presence of achlorhydria in 12 per cent of cases of our series. We know that according to Hurst (1937) the incidence of physiological achlorhydria is 4 per cent at the age of 20 years (Bennet and Ryle), 8 per cent between 30 and 39 years and 12 per cent between 40 and 49 years. In the next three decades there is a further rise of only about 4 per cent. The ages of achlorhydria cases in this series were between 30 and 50 years. Whether the incidence of achlorhydria in these people falls within the

(*Concluded at foot of next column*)

CHEMOTHERAPY IN BACILLARY DYSENTERY

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O'BRIEN (1940) reported the striking effects of sulphanilamide on Flexner and Sonne infections in laboratory animals. Similar experiments with Shiga infections were disappointing in their results.

Every practitioner in this country is frequently faced with the problem of treating those distressing cases labelled 'chronic bacillary dysentery'. His efforts are occasionally successful, but the more usual experience —and that in spite of a tiresome régime of successive treatments—is increasing anasarca progressing to œdema and death. At the time of reading O'Brien's remarks I had several such cases on hand and resolved to try chemotherapy on them. They were treated with sulphanilamide; some of them cleared up within seven to fourteen days and others showed no improvement. These resistant cases were then given sulphapyridine (M.&B. 693) and they all cleared up within four or five days.

It appeared from these observations that:—

1. Sulphanilamide is effective against some of the organisms of bacillary dysentery.
2. Sulphapyridine is more effective than sulphanilamide and, that, on organisms against which sulphanilamide is ineffective.
3. A clinical trial of these drugs on a large scale would be well worth while.

Not having facilities for the bacteriological typing of individual infections, I decided to conduct a trial by comparing the results of chemotherapy with those obtained by other methods of treatment. A total of 144 cases have been the subject of this comparison experiment; most of them arose on one estate as a

(*Continued from previous column*)

above category or is the result of gastritis is a suggestion for consideration.

Conclusions

1. Hyperacidity commonly occurs in chronic ulcerative colitis.
2. The gastric symptoms in this disease are due to the anomaly of the gastric secretion.

REFERENCES

BELL, J. R. (1922) .. *Guy's Hosp. Rep.*, **72**, 302.
BHATTACHARYA, S. (1933). *Calcutta Med. J.*, **28**, 223.
HURST, A. (1937) .. *British Encyclopædia of Medical Practice*, **3**, 292. Butterworth and Co., Ltd., London.
NAPIER, L. E., CHAUDHURI, R. N., and RAI CHAUDHURI, M. N. (1938). *Indian Med. Gaz.*, **73**, 65.
RAO, M. N. (1937) .. *Indian J. Med. Res.*, **24**, 1145.

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result of a large influx of casual labour to a P.W.D. undertaking.

In all cases the stools were microscopically suggestive of bacillary dysentery and the majority were, clinically, Shiga infections. As will be seen this is a supposition borne out by the relatively high death rates with treatments other than sulphapyridine. Some cases were admitted early in the disease, while others had been ill for several days and were brought to hospital when moribund.

Treatment.—Cases were put on to one of the following treatments:—

1. Polyvalent anti-dysenteric serum.
2. Sodium sulphate.
3. Sulphapyridine.
4. Sulphanilamide.

Selection of treatment was casual, except that cases admitted within 72 hours of the onset of the disease were given either serum or chemotherapy. Later cases were given saline or chemotherapy. The use of sulphanilamide was discontinued after 19 cases had been treated, as not being sufficiently effective.

Serum treatment.—The smallest dose of serum used was 40 c.c. Some cases received over 100 c.c. The intravenous route was used wherever possible and, if necessary, glucose-saline was administered at the same time.

Sulphapyridine treatment.—The dosage of this drug varied. In general, it appeared that the rapidity with which one might expect an effectual response varied directly as the size of the dose. The smallest effective dose used was 3 grammes (6 tablets) in two days in what appeared to be a mild case. The average case appeared to need from 16 to 30 tablets to effect a cure. Administration was started with a large dose—4 tablets—and continued thereafter with 2 tablets three hourly until the general symptoms subsided. In two cases the injection method of treatment described by Bryant and Fairman (1940) was tried, but the results were not satisfactory: this was also observed when the tablets were given whole and not crushed and suspended in water.

Summary of results obtained with different treatments

Treatment	Number of cases	Deaths	Deaths, per cent
Serum	38	2	5.3
Saline	31	9	29.0
Sulphanilamide ..	19	4	21.0
Sulphapyridine ..	56	1	1.8

From these figures it is obvious that sulphapyridine is an effective treatment for bacillary dysentery.

The death occurring under treatment with sulphapyridine was that of a chronic case in a marasmic child aged 2 years who was also suffering from malaria.

Clinical effect of sulphapyridine on bacillary dysentery

This can be best described by giving typical case histories.

Case 1.—An Ooria labourer, aged 22 years, suffering from constant motions containing blood, mucus and slough, was admitted to hospital on the third day of the disease. His temperature was 101.8°F. and the pulse weak and rapid.

First day of treatment.—Twelve tablets given. Stools reduced to five in the evening: temperature down to normal by evening.

Second day of treatment.—Eight tablets given. Stools 6. Character—watery and blood-stained with slight mucus only; much less offensive. No stool during the night of this day, and the patient slept well.

Third day of treatment.—Four tablets given. No more was given. Stools 2 only, containing blood and a trace of mucus.

Sixth day of treatment.—Stool normal.

Case 2.—A boy, aged 12 years, was admitted to hospital in a collapsed condition, pulse imperceptible and temperature below 96°F. Stools were innumerable and consisted of blood, mucus and slough. He had been ill in the lines for four days. General resuscitatory treatment and the administration of sulphapyridine were immediately commenced. He was given a total of 19 tablets: 6 on the first day, 5 on the second day and 4 on each of the two subsequent days. His general condition improved greatly and stools became much reduced; but they contained slough until the fourth day, and it was not until the ninth day that his stool was formed and normal. He was discharged on the 18th day after admission. Under any other form of treatment than with M.&B. 693 this child would have died.

Case 3.—This is the case of one of my assistant medical officers. I quote it because he was able to give an accurate subjective account of his experience and because the course taken by the disease in his case is typical of what happens in an acute case treated early with sulphapyridine.

His illness started one evening with a temperature of 104°F., diarrhœa, nausea and tenesmus. The stools contained blood and mucus and numbered 18. He started a course of bacteriophage. On the next day his stools were uncountable and the pain severe. His temperature was now 99°. I then saw him, stopped the bacteriophage and put him on to sulphapyridine. He had 25 tablets in all; 12 tablets the first day, 8 the second day and 5 on the third day. Describing the effects of this medication he said: 'It was marvellous; within 18 hours the stools had decreased and the pain gone. I slept that night. I had one stool on each of the next two days, slightly tinged with mucus. On the fourth day after taking M.&B. 693 my stool was normal and I went back to work'.

Summary of experience in the treatment of bacillary dysentery with M.&B. 693

1. Sulphapyridine appears to be specific against infections with bacillary dysentery.

2. It relieves the pain within 12 to 18 hours.

3. The stool becomes normal within three to seven days: in my cases the average time required for the appearance of a normal stool was 4.7 days.

4. Blood disappears from the stool first; the mucus persists longer.

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A PECULIAR NEUROLOGICAL SEQUEL TO ADMINISTRATION OF 4 : 4′-DIAMIDINO-DIPHENYL-ETHYLENE (M.&B. 744)

By L. EVERARD NAPIER, F.R.C.P. (Lond.)

and

P. C. SEN GUPTA, M.B. (Cal.)

(*From the School of Tropical Medicine, Calcutta*)

4 : 4′-DIAMIDINO-DIPHENYL-ETHYLENE is one of the chemical compounds prepared by Dr. A. J. Ewins of Messrs. May and Baker that has been found very effective in the treatment of kala-azar by workers in different parts of the world. The drug was tried by Warrington Yorke (1940) on an Indian seaman suffering from kala-azar in Liverpool, by Napier and Sen (1940) in Calcutta, and by Kirk and Sati (1940) in the Sudan, in each instance with remarkable success. Other reports have followed and at present a report by the present writers and a colleague on the treatment of 98 cases of kala-azar is in preparation. Our total experience of the drug now amounts to over a hundred cases, as we have used it—with little success—in other forms of leishmaniasis.

Administration of this drug has not been absolutely free from unpleasant reactions; among these are a burning sensation all over the body, flushing of the face, transient difficulty in breathing, nausea, vomiting, epigastric distress, giddiness, palpitation, sweating and occasionally collapse.

The almost constant finding during and immediately after the first few injections of this drug has been a marked fall of blood pressure, both systolic and diastolic, the former to a greater extent than the latter. A drop of 20 to 40 mm. of mercury within a minute or two of the injection has been found in all cases showing the more severe symptoms, and the drop has been even greater in the patients who collapsed. The blood pressure rises to nearly the previous level in almost all cases within 5 to 10 minutes and with this rise most of the symptoms disappear. In the cases in which there are serious reactions, an injection of adrenaline raises the blood pressure almost immediately and the unpleasant symptoms subside. When in such cases an injection of adrenaline is given a few minutes before a subsequent injection, little or no fall of blood pressure takes place and the symptoms may be entirely absent.

The symptoms, giddiness, faintness, palpitation, sweating, epigastric distress and collapse, can be readily explained in most cases by this fall of blood pressure that results from the injection. If we regard the drug as having a histamine-like effect, the sudden fall of blood pressure and the symptoms associated with it, the flushing of the face, the hot sensation, the occasional burning sensation in the different parts of the body, and the dyspnœa can all be explained. The fact that adrenaline relieves these symptoms, also supports this point of view.

During the period that we have used this drug, four of our patients, one Bengali, two Hungarians, and one Anglo-Indian, have developed a peculiar neurological symptom-complex subsequent to their treatment with this drug. Had the symptoms appeared in one patient only, we would probably have overlooked the possibility of any connexion with this drug, but the fact that four patients all showed very similar symptoms a few months after the administration of this drug, led us to carry out general neurological investigations in these cases, and to write this note.

Case 1.—Bengali business man, aged 34 years, was admitted on the 16th April, 1941. He said he had kala-azar in 1924 for which he was treated with organic antimonials intravenously. The patient came complaining of irregular attacks of fever for seven months and nodular eruptions over the face for 1½ years. On admission, the spleen was found to be enlarged down to 5½ inches below the costal margin, measured from the tip of the 9th rib, and the liver was enlarged 1½ inches below the costal margin. He had the nodular type of dermal leishmaniasis on his chin and nose. The aldehyde test was positive and the spleen puncture smear showed *Leishmania donovani*. Smears made from snippings from the dermal nodules also showed leishmania. The patient was treated with a course of 4 : 4′-diamidino-diphenyl-ethylene (M.&B. 744), 15 intravenous injections were given from 28th April to 12th May, 1941; the total dose was 1.535 grammes.

The patient was discharged from the hospital on 10th June, 1941, apparently cured of kala-azar. He was afebrile, the hæmoglobin had risen from 9.9 gm. per cent to 14.02 gm. per cent, the spleen was reducible under the costal margin, and he had put on 5 lb. in weight. The dermal lesions were unaffected and he was advised to attend the outpatient department for treatment of the dermal condition.

He was seen again in October 1941. He complained that since August 1941, he had been suffering from numbness and partial anæsthesia over his forehead, that exposure to the sun's rays for a time caused a burning sensation, that he had an intense sensation of cold when a slightly cold object came in contact with his forehead and cheek, and that shaving was quite painful (hyperæsthesia to temperature and touch). The trouble started as a sense of impairment of sensation over the upper lip, nose and forehead.

On examination.—He was found to be in good health, but the nodules of dermal leishmaniasis persisted unaltered on his chin and nose. The nose and the throat were apparently normal, the teeth and gums showed evidence of pyorrhœa, and there was tartar present. No abnormality was noticed in the heart or lungs. The liver was not palpable and the spleen was just palpable on deep inspiration.

(*Continued from previous page*)

5. The earlier in the disease the sulphapyridine treatment is started the quicker the response.

6. The period of hospitalization was 30 per cent less than that with the next most efficient form of treatment—*i.e.*, serum.

7. It is relatively cheap: the most I spent on any one case was Rs. 3 as compared with Rs. 4 to Rs. 14 for serum treatment.

REFERENCES

BRYANT, J., and FAIRMAN, H. D. (1940). *Trans. Roy. Soc. Trop. Med. and Hyg.*, **34**, 117.

O'BRIEN, R. A. (1940). *Ibid.*, **33**, 573.

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There was no abnormality in the cranial nerves I, II, III, IV, VI, VII, VIII, IX, X, XI, XII, or in the motor part of V. There was a loss of sensation to light touch over the forehead, nose, and part of the cheek. Perception of deep pressure and pain were unimpaired. There was no tenderness of the branches of the Vth nerve on pressure. The motor functions were normal and there was no disturbance of sensory functions elsewhere. The visceral reflexes were unimpaired and there was no vasomotor disturbance or trophic change. Superficial and deep reflexes were equal and normal on both sides.

There are two other points of special interest in this case, namely, that it is one of the very few apparently authentic cases of re-infection, and that it is an instance, equally rare, of the co-existence of a visceral and a dermal infection with *Leishmania donovani*.

In a not inconsiderable experience, the senior writer has only encountered one other case in which there was any real evidence of a re-infection occurring—a child who had been treated a year previously in his own wards as a very early case of kala-azar, diagnosed by cultural methods. In this case relapse was excluded by the clinical history and the serological tests. He has had many cases in which there was a history of treatment for kala-azar some years before, but the authenticity of the first diagnosis has always been in doubt.

Only one or two cases of the co-existence of a visceral and a dermal infection have been reported (these also must necessarily have been cases of re-infection or relapse of kala-azar).

Case 2.—A Hungarian business man, aged 40 years, was admitted on the 10th January, 1941, for repeated attacks of fever since May 1940. He was diagnosed as and treated for kala-azar in another hospital, where he had a full course of injections but without benefit. He was apparently a 'resistant case' of kala-azar. The spleen was enlarged down to 8 inches below the costal margin. The diagnosis was confirmed by a strongly positive aldehyde test and by the finding of numerous *Leishmania donovani* in the spleen puncture smear. The patient was treated with a course of M.&B. 744. Fifteen intravenous injections were given from the 13th January to 27th January; the initial dose was 0.03 gm., the maximum dose 0.18 gm. and the total dose 1.66 gm. No untoward reactions were noticed during the course of treatment. The patient left hospital on the 28th January; he was afebrile, the spleen was softer and now measured 6½ inches below the costal margin and the hæmoglobin had risen from 7.975 gm. per cent to 9.762 gm. per cent.

Subsequent to his discharge from the hospital he attended the outpatients' department on several occasions and the splenic enlargement steadily decreased and the general health improved.

In May 1941, the patient experienced a sense of heaviness over the forehead and face, and this part seemed to be somewhat reddish in colour. Three weeks later he developed loss of sensation over this area. He was investigated at a general hospital and two of his teeth were removed; no abnormality was detected in his nose or sinuses. He had various treatments for this condition without benefit.

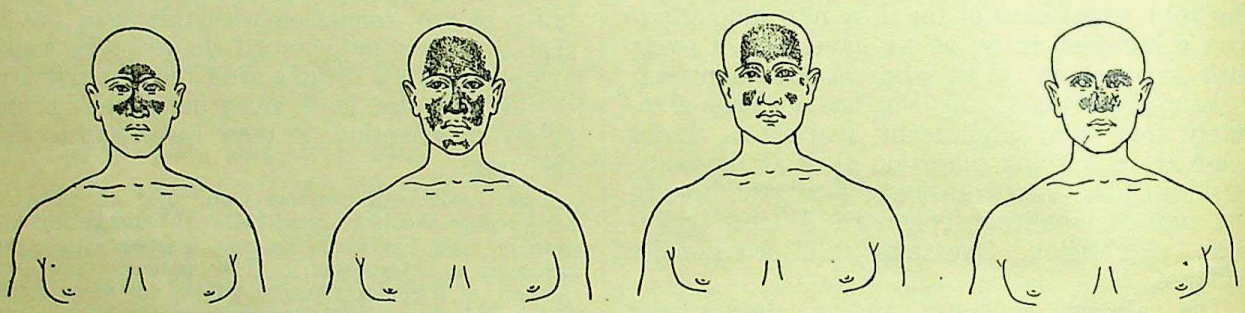
He was seen again in November 1941. He was complaining of a sense of heaviness over his forehead, face, eyelids and nose. His upper lip felt 'swollen'.

He could not keep his eyes shut tightly, there was a blinking movement of the eyelids, and occasionally a spontaneous twitching of some of his face muscles drawing up the angles of the mouth. He also complained of an erythematous rash developing over the chin and the tip of the nose.

He looked quite healthy. There was an erythema over the tip of the nose and the chin (the question of very early dermal leishmaniasis arose).

On examination.—No abnormality was detected in his nose and nasal sinuses, the remaining teeth were apparently healthy. The heart and lungs were quite normal. Neither spleen nor liver was palpable. There was no disturbance of function of the cranial nerves, I, II, III, IV, VI, VII (except for inability to keep the eyes shut tightly, the blinking movements, and twitching of some face muscles), VIII, IX, X, XI, XII, and motor part of the Vth cranial nerve. There was loss of sensation to light touch over the forehead, nose, upper eyelids, cheek, and part of the chin. There was perception of deep touch and pain as tested by a pinpoint. There was no tenderness of any of the branches of the trigeminal nerve. Motor functions were normal all over and there was no impairment of sensation in any other part of the body. Superficial and deep reflexes were quite normal on both sides and there was no impairment of visceral reflexes or disturbance of the vasomotor system.

The neurological condition has shown little or no change in eight months since it was first noticed by the patient.



Case 1. Case 2. Case 3. Case 4.

Anæsthesia to light touch with preservation of sensation to pain, temperature and pressure is shown by the stippled area.

An area of complete anæsthesia (case 4) is marked by a cross.

Case 3.—An Anglo-Indian engineer, aged 26 years, was admitted on the 9th January, 1941, for fever for two months. He had been a patient in the hospital in August 1940, suffering from kala-azar and had been treated with a course of injections of neostibosan. After discharge from the hospital he remained afebrile for a month or so and then the present attack of fever commenced. At first, the attacks came on at irregular intervals, but at about the time of admission to the hospital it came on daily with chill and rigor. On examination, he was found to have an enlargement of the spleen 6 inches below the costal margin. No other abnormality was detected. The diagnosis of 'resistant' kala-azar was confirmed by demonstration of numerous *Leishmania donovani* in a sternal puncture smear.

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He was given a course of 15 injections of M.&B. 744, intravenously, from the 9th January, 1941. The total dose was 1.36 gm. He was discharged from the hospital on 3rd February, 1941, apparently doing well: he was afebrile, the spleen had gone down considerably (2½ inches below the costal margin), and the hæmoglobin had risen from 6.325 gm. per cent to 8.662 gm. per cent.

In May 1941, the patient experienced a sensation like cramp in his upper lip. After about 3 weeks this symptom disappeared. Soon after, he felt a numbness first over the eyebrows, then it spread to the forehead and part of the face. Occasionally, he felt as if there was ice-cold water running down his neck. Since June 1941, he has often felt 'as if there were some worms running down the skin of his forehead' (formication) and this gave rise to itching, and was very disturbing. He had all his teeth extracted, and the nasal sinuses were attended to by a specialist.

He had injections of vitamin B_1 and some other treatments to no effect.

On examination.—The patient was apparently quite healthy. There was no detectable abnormality in his nose or throat. He had a complete set of false teeth. There was no abnormality in the heart or the lungs. Neither liver nor spleen was palpable. There was no disturbance of function of the cranial nerves, I, II, III, IV, VI, VII, VIII, IX, X, XI, and XII, or of the motor part of the Vth nerve. There was a loss of sensation to light touch over the forehead and anterior one-third of the head (a light touch to the hair over this was not felt), root of the nose, part of the cheek and right upper eyelid. There was some impairment of sensation to heat but not to cold over the forehead. The sensation of pain and deep touch were unimpaired. There was no tenderness of any of the branches of the Vth nerve. Motor functions were normal all over the body and there was no impairment of sensory functions over other parts of the body. Superficial and deep reflexes were equal and normal on both sides and there was no impairment of visceral reflexes or of the vasomotor system.

There has been little change in the symptoms during the last six months.

Case 4.—A Hungarian student, aged 15 years, was admitted on the 11th August, 1941, for intermittent fever for one month. On admission, the patient had an enlargement of the spleen 5½ inches below the tip of the 9th costal cartilage and the liver was palpable on inspiration. There was no other obvious abnormality. On investigation the aldehyde test was positive, and *Leishmania donovani* were found in the sternal puncture smear. The patient was treated with a course of 10 injections of M.&B. 744, from 12th to 21st August. The total dose was 0.96 gm. and the maximum single dose was 0.12 gm. The temperature came down to normal during the course of the injections. The patient was given a course of crinodora (atebrin-like compound), 1 tablet *t.d.s.* for five days, for giardia infection, and was discharged on 1st September, 1941. The spleen was greatly reduced, being just palpable on inspiration, at the time he left hospital.

He was seen again on 27th December, 1941. He complained of impairment of sensation and a sense of numbness over his face, a symptom he noticed whilst washing his face about a month before. He also complained of anæsthesia over his nose for about 3 or 4 weeks.

On examination the patient was found to be otherwise healthy. The throat was slightly congested, the tonsils had been removed two years previously and there was one 'filled' tooth, the rest being healthy. He had an attack of common cold, and the nasal mucous membrane looked congested. The heart and the lungs were quite normal. The liver and the spleen were not palpable. The left palpebral fissure was slightly wider than the right, but this condition had been present since childhood.

Neurological examination failed to reveal any abnormality in the cranial nerves I, II, III, IV, VI, VII, VIII, IX, X, XI, XII, and the motor part of V. There was anæsthesia to light touch over the areas indicated in case 4, with preservation of sensation of pain, pressure and temperature. In one small area (marked x) there was complete anæsthesia. There was some impairment of sensation over the scalp corresponding to the distribution of the ophthalmic division of the trigeminal nerve. He could feel similar light touch better over other areas of the scalp than over this part. There was no marked tenderness of the main branches of the trigeminal nerve on pressure. The motor function was unimpaired and the superficial and deep reflexes equal and normal on the two sides. The sensory function, visceral reflexes and vasomotor system were quite normal.

Discussion.—The salient features of the above four cases are: (1) Subjective disturbance of sensation over various parts of the trigeminal area, paræsthesia, anæsthesia, formication, and hyperæsthesia. (2) Loss of sensation of light touch over this area, with the preservation of sense of pressure and pain (dissociated anæsthesia). (3) No evidence of other neurological or any systemic disorder.

The fact that there is evidence of loss of function of the sensory part of the nerve rules out the possibility of trigeminal neuralgia. The affected areas do not coincide with the whole of the distribution of any of the branches of the 5th nerve and the dissociated anæsthesia and lack of trophic changes preclude the lesion being of the nature of peripheral neuritis.

Syringobulbia and thrombosis of the posterior inferior cerebellar artery give rise to lesions involving the medulla and the upper cervical segments of the spinal cord, and these by injuring the spinal tract and its nucleus will cause analgesia and thermo-anæsthesia, with preservation of sensibility to light touch. But in our cases, the conditions were exactly the opposite.

The following quotation from Russell Brain (1933) would appear relevant: 'Owing to the divergence of the sensory fibres of the trigeminal nerve within the brain stem, dissociation of sensibility over the face commonly results from central lesions. A lesion of the pons which involves the principal sensory nucleus will cause anæsthesia to light touch over the trigeminal distribution, with preservation of appreciation of pain, heat and cold'.

It would thus appear that the site of the lesion in these cases is in the pons, affecting the chief sensory nucleus. It is not possible to be dogmatic as to the nature of this lesion; it is possibly a toxic degenerative condition.

The slight weakness of the orbicularis oculi and occasional twitching of face muscles in case 2 are possibly due to irritation of the nucleus of the VIIth nerve which is situated in the pons.

The next question that arises is whether diamidino-diphenyl-ethylene can be regarded as the cause of this lesion. In this connexion, we must emphasize that there has been a complete absence of similar symptoms following any other

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form of treatment for kala-azar, or in untreated cases of kala-azar, in the senior writer's experience of the disease in India.

The symptoms appeared a short period (3 to 4 months) after the cessation of treatment with this drug, in no case could any other cause be found, and the syndrome is entirely unlike any of the recognized diseases of the nervous system; the drug is, therefore, undoubtedly incriminated as the toxic agent causing this neuropathy.

This appears to be a particularly good example of the selective action of a drug on one particular part of the central nervous system. There are other examples of this selective action, *e.g.*, wrist drop in lead poisoning, though in this case the action is less specific. Trichlorethylene inhalation in industry is reported to produce bi-lateral loss of sensation confined to the distribution of the trigeminal nerve, a condition which is suggestively similar to the one we are describing.

The facts that the symptoms were noticed by the more intelligent patients and that these four cases constitute a considerable proportion of the patients we have examined subsequent to the course of treatment by this drug, suggest that this neuropathy may have been more frequent than this report on only four cases would appear to indicate, and careful enquiries should be undertaken to ascertain whether similar symptoms have occurred in patients treated in other parts of the world.

On the other hand, three out of four were 'resistant' cases and therefore a larger total dose was given than would be given to a previously untreated patient.

Prognosis.—Two of these four patients (cases 2 and 3) were under observation for some months and the condition did not seem to progress during this time. On the other hand, some of the patients suggested that the area involved was greater when they first noticed the condition than at the time of examination. We are probably justified in inferring that the condition is not progressive and that there is a tendency to spontaneous cure.

Summary

1. Four cases of kala-azar, treated with 4 :4′-diamidino-diphenyl-ethylene, developed anæsthesia to light touch over the trigeminal area with preservation of sensation of pain, temperature and pressure.

2. The lesion is apparently in the pons, involving the principal sensory nucleus of the trigeminal nerve, and is possibly a toxic degenerative condition.

3. 4 : 4′-diamidino-diphenyl-ethylene is probably the toxic factor responsible.

4. The lesion is not progressive and its symptoms do not cause much physical discomfort. It would appear that the condition

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USES OF TESTOSTERONE PROPIONATE: A REVIEW TOGETHER WITH SHORT REPORTS ON ITS USE IN SENILE PRURITUS AND SENILE ARTHRITIS IN MALES

By M. L. GUJRAL, M.B., M.R.C.P. (Lond.)

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TESTOSTERONE PROPIONATE, the synthetic male sex hormone, is a potent therapeutic agent in the treatment of certain male and female disorders. It was first isolated from bulls' testes and later synthetically from cholesterol. It has been used clinically with marked success by many workers. In spite, however, of the fact that much has been written about it in recent years, the literature on male sex hormone as applied to various clinical conditions is still far from complete. Thus far, no clear-cut understanding as to the indications for therapeutic use of the hormone has been established. What is more important, the dangers of its indiscriminate use are apparently not realized by those who use it.

The following indications for the use of testosterone propionate are briefly considered :—

A. In males

1. Eunuchism, Eunuchoidism, Hypogonadism.
2. Cryptorchidism.
3. Male climacteric.
4. Premature senility.
5. Senile pruritus in males.

(*Continued from previous column*)

improves with time, as is the case in many other toxic affections.

5. One of the cases reported was incidentally a rare instance of the co-existence of dermal and visceral lesions of leishmania infection.

REFERENCES

BRAIN, W. R. (1933) .. *Diseases of the Nervous System.* Oxford University Press, London.

KIRK, R., and SATI, M. H. (1940). *Ann. Trop. Med. and Parasit.*, **34**, 83, 181.

NAPIER, L. E., and SEN, G. N. (1940). *Indian Med. Gaz.*, **75**, 720.

YORKE, W. (1940) .. *Trans. Roy. Soc. Trop. Med. and Hyg.*, **33**, 463.

Postscript.—We have since seen three more patients, two Bengalee males and one Anglo-Indian female, who have developed similar dissociated anæsthesia over the trigeminal area. In the Anglo-Indian female patient there was dissociated anæsthesia also over both sides of the neck corresponding to areas supplied by the cutaneous branches of the posterior roots of the third cervical nerves of the spinal cord. It is probable that in this case the lesion had spread to some fibres of the lemniscus which are situated close to the sensory nucleus of the trigeminal nerve in the pons.

The observation of these further cases adds weight to our suggestion that this sequel to the use of diamidino-stilbene may be much more common than we first believed.

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6. Impotence.
7. Male infertility and defective spermatogenesis.
8. Benign prostatic hypertrophy.
9. As a 'tonic'.
10. Degenerative or senile arthritis.

B. In females

1. Chronic mastitis.
2. Menorrhagia.
3. Pre-menopausal uterine bleeding.
4. Uterine fibromata.
5. Dysmenorrhœa.
6. Precocious sexual maturity.
7. Frigidity.
8. Continuation of pregnancy beyond term.
9. Inhibition of lactation.
10. Otosclerosis in the female.

A. In males

Eunuchism and eunuchoidism.—A eunuch is a castrated male; the operation is performed before puberty. Sometimes trauma or disease necessitates a bilateral orchidectomy in later life.

Eunuchoidism is not artificially produced; it arises from disease of the testicle, occurring not later than in early adolescence or from a congenital testicular hypoplasia. The clinical picture resembles that of eunuchism when the operation is performed before puberty. It is called primary eunuchoidism when it is associated with an essential hypogonadism and deficiency of the male sex hormone, and secondary eunuchoidism when it results from disease of the testicles. Inflammatory conditions such as mumps, typhoid, syphilis and tuberculosis, trauma, or new growth of the testicles may lead to a deficiency of secretion of the male sex hormone.

Clinical features.—The majority of the patients present themselves at the age of puberty because of failure to develop, but in some cases the main symptoms do not appear until the age of 30 years (delayed eunuchoidism). Eunuchoids have unbroken and high pitched voices and their facial and body hair is either very scanty or absent. The genitalia are invariably hypoplastic, with an infantile penis which is sometimes minute, and atrophic testicles, which, when properly descended, lie in a small and relatively unpigmented scrotum. The prostate and seminal vesicles are poorly developed and only rarely palpable *per rectum*. The pubic hair, if present at all, is of the female distribution with a straight upper border and without an upward v-shaped extension on to the abdomen. Sexual desire is usually slight, but some cases do get erections before coming for treatment. The height is generally above the average, on account of the failure of the epiphyses to unite at the usual time. Contrary to the popular belief all eunuchs are not obese, and the same applies to eunuchoids. There is a local increase in fat at the sites where it normally accumulates in the female such as over the hips, the breasts and the mons veneris. Eunuchoids have often poor muscular development and their skin is of fine smooth texture. This delicate skin, while it assists in producing the youthful appearance which is characteristic of this condition, tends to wrinkle in later life. Most eunuchs are intelligent people and some are brilliant. There is also a proportion of cases which is subnormal mentally, suffers from anxiety states or shows frank psychotic manifestations. The excretion of androgens in the urine is usually minimal.

Therapy.—Foss (1937) has made observations on a man of 38, whose testicles were removed on account of a shrapnel wound during the last war. Sexual function and libido were restored by administration of 100 to 140 mg. per week. Vilaret *et al.* treated a 21-year-old eunuchoid by daily injections of 10 to 30 mg. of testosterone propionate. There resulted a marked development of the genitals, the face assumed a more manly appearance, the voice broke, there was a growth of hair and an increase in weight and muscular development. Kenyon (1938) treated 4 cases with 25 mg. daily for periods varying from 28 to 99 days. All had an increase in the number of erections and the size of the prostrate, there was a marked increase in the size of penis and in the amount of the body and facial hair, and in 2, there was a deepening of the voice. Vest and Howard (1938) obtained similar results in 6 patients. There was a growth of the penis scrotum and prostate, the voice deepened and the pubic hair appeared. There were also ejaculations, libido and potentia in one case when none had existed before.

McCullagh (1939) reported on the urinary excretion of androgens in normal males, in cases of testicular deficiency and after injections of androgens. In normal persons, the average number of bird units of urinary androgen were 30; the highest and the lowest figures were 72 and 16 bird units respectively. In prepuberal hypogonadism of the adults the figures for urinary androgen were extremely low. McCullagh selected 6 cases of prepuberal hypogonadism and treated them for several months with gonadotropic hormone, pregnancy urine extracts, pituitary extracts or a combination of these. There was no rise in the urinary androgens, nor any symptomatic nor anatomical improvement. With injections of testosterone there was some penile growth, a questionable increase in the axillary and pubic hair and some penile erections. Injections of testosterone propionate 10 mg. twice weekly were then commenced. The level of the urinary androgens rose rapidly and symptomatic and anatomical changes followed in approximately the following order : penile erections occurred promptly and there was an increase in the pubic and axillary hair. The penis grew markedly and the scrotum less so, and the prostate growth appeared to lag perceptibly in proportion. There was no consistent evidence of increased testicular size,

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although the testes appeared to be larger after treatment in one case. Nocturnal emissions occurred and the quantity of semen increased. No diminution in sperm count or inhibition of sperm production was obvious where sperms were present, though this may not be so where there is a normal number of spermatozoa before therapy. The larynx grew in size and the voice became lower. The appearance changed from juvenile to adult type and the face showed acne and growth of the beard. Epiphyseal closure did not exceed its expected normal rate.

Dosage and methods of administration.—The question of dosage must be decided for each individual case, but 25 or 50 mg. of testosterone propionate intramuscularly twice weekly are suitable doses with which to commence treatment. If no improvement occurs injections should be continued for a minimum period of three months before they are considered to be useless. The mode of administration recommended is by intramuscular injections but the hormone can also be given percutaneously by inunction, by mouth in the form of methyl testosterone (Finkler and Cohn, 1941) or by the subcutaneous implantation of a tablet from which slow and continuous absorption can take place.

Richardson recommends that after giving testosterone propionate for some weeks a course of gonadotropic hormones may be begun to stimulate the testes. Serogan (B.D.H.) or antostab (Boots) in an attempt to stimulate spermatogenesis and gonan (B.D.H.) or pregnyl (Organon) to stimulate the interstitial cells to produce their own male sex hormone.

Cryptorchidism.—Hamilton induced testicular descent in 9 immature macaque monkeys—normally cryptorchid until puberty—within 14 days by injections of testosterone propionate.

Bleriot treated 9 cases of cryptorchidism in boys by injections of 5 to 10 mg. of perandren (Ciba) twice weekly. Descent of the testes usually occurred after a total of 100 to 150 mg. Grignon induced descent of the testes in a cryptorchid of 13 years of age, after 15 injections of perandren. Bishop considers that cryptorchidism is more successfully treated by gonadotropic therapy, though Hamilton prefers male hormone therapy because its action is independent of a functional testis, and because the effects thereof are less widespread throughout the body.

Male climacteric.—Werner, discussing the male climacteric, states that 'an endocrine dysfunction *plus* the imbalance of equilibrium between the two divisions of the autonomic nervous system with the evidence at times of disturbance in the psychic centres is due primarily to the decline of the sex glands'. He reports 2 cases. One patient complained of nervousness, mental depression and hot flushes which occurred about three times a month and lasted an hour. The patient also gave a history of vertigo, numbness and tingling of the extremities, palpitation, breathlessness, fatigability and headache. He was given injections of 10 mg. perandren three times a week. The results were very impressive but the symptoms returned with discontinuance of the therapy. The second patient was a partial castrate, with atrophy of the remaining testicle. The symptoms were classical. After treatment with 10 mg. of perandren three times a week the patient seemed much improved and his symptoms had disappeared. McCullagh (1939) records the case of a man aged 58, complaining of irritability, excitability and melancholia and almost complete impotence. The urinary androgen content was very low—3 units. Injections of testosterone propionate 2.5 mg. on alternate days were commenced two and a half years after the onset of symptoms. In about two weeks he was sexually normal with great diminution in the sense of melancholy and irritability. The dose of testosterone was increased to 10 mg. on alternate days and the treatment was continued for 16 months. Sexual potency remained normal on cessation of treatment.

These results have been amply confirmed by workers from different parts of the world.

Senile pruritus in the male.—On 15th January, 1940, a male aged 54, suffering from otosclerosis, presented himself in the writer's office. It was decided to treat his deafness with injections of the follicular ovarian hormone. Injections of menformon were therefore commenced. After the fourth injection the patient developed tremor of the extremities and mild symptoms of depression. No great significance was attached to these as the patient's hearing began to improve. After the sixth injection his hearing was definitely better, but he had developed symptoms of a profound involutional psychosis. He had also intolerable itching all over the body.

Injections of testosterone propionate 25 mg. (twice weekly) were then commenced. After a course of 12 injections his mental symptoms were definitely improved and his pruritus had disappeared.

Five more cases of idiopathic general pruritus have since been treated by the writer by injections of testosterone propionate. Three of these cases were in males over the age of 50 years. One patient was an old woman aged 63. The remaining patient was a young man aged 27. Definite improvement was manifested in all the three elderly men patients after six injections of 25 mg. of testosterone propionate. In 2 the pruritus totally disappeared after ten injections and in the third there was a relapse after discontinuation of the treatment. This was, however, controlled by further injections of 10 mg. twice weekly. After three months' treatment with testosterone propionate pruritus disappeared in this patient as well. In the remaining 2 patients—the old woman of 63

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and the young man—there was no change in the condition at all, even after a dozen injections of the drug.

Though the number of cases treated is too small to draw definite conclusions it appears that senile pruritus in men is in some way related to a failure of the male sex hormone. This consideration is strengthened by the fact that treatment with male sex hormone succeeded only in old males and had no effect in both the other patients.

Impotence.—Sexual impotence in the male may be due to one or more of the following causes: (1) psychic disturbances, which are commonest and most difficult to treat; (2) organic disease of the nervous system, which is usually overshadowed by other manifestations; (3) local lesions of the genitalia, which are unimportant numerically and easily recognized, and (4) disorders originating from disturbances of the endocrine glands.

Huhner (1939) reported 7 cases of impotence successfully treated with injections of 10 to 25 mg. of testosterone propionate given two or three times a week. These results have, however, not been confirmed by Creevy and Rea, who treated 12 patients with impotence without evidence of hypogonadism, with testosterone propionate without any improvement in the impotence. Spence (1940) treated 6 patients with functional impotence unassociated with hypogonadism unsuccessfully and concludes that testosterone propionate has no effect on impotence due to psychological disturbances.

In the writer's opinion, benefit from treatment with testosterone propionate results only in those cases of impotence in which either the function is poorly developed or fails during later life. In all these cases the urinary androgen content is low and is raised by injections of testosterone propionate. When improvement follows the use of testosterone propionate in cases of psychic impotence, invariably evidence of hypogonadism is also present. In purely psychic cases of impotence increase of libido or sexual desire does not follow the use of the male sex hormone.

Male infertility and defective spermatogenesis.—It is generally agreed that gonadotropic therapy is more suited to this condition than injections of male hormone. Rubinstein, however, reported initiation of spermatogenesis in an adult hypogonad patient following treatment with testosterone propionate. Rubinstein and Kurland treated 8 normal adult males with 5 mg. perandren injected intramuscularly three times in a week. There was increase of spermatozoal counts in all. Increasing the dosage to 25 mg. per injection in the normal adult led to a depression of the count. Whether counts were raised or depressed during therapy, cessation of treatment soon led to a return of normal figures. McCullagh (1939) was unable to find any evidence of oligospermia in the series of cases treated by him. Heckel (1940) treated 15 patients with testosterone proprionate. Of these 10 had normal spermatozoa counts, 2 had moderate oligospermia, and 3 had an extreme oligospermia of undetermined cause, before treatment was commenced. Ten of the 12 patients, including the 2 that had a moderate oligospermia, showed a great depletion of spermatozoa as a result of the treatment. In 2 patients no great change occurred in the number of spermatozoa.

Of the 3 patients who had a marked oligospermia before treatment, 2 showed a slight temporary increase in the number of spermatozoa after injections of testosterone propionate, and the sperm count of the other one showed no remarkable change. Heckel considers that in patients of such marked oligospermia more information is needed before definite conclusions can be drawn concerning the influence of this material upon spermatogenesis. It is logical to see how the androgens might increase spermatogenesis in these patients if the cause is from a deficiency of testicular hormone.

Promiscuous use of testosterone propionate in persons with normal testicular function is to be deprecated.

Benign prostatic hypertrophy.—There is considerable evidence to show that the male sex hormone can arrest the changes produced in the prostate of immature experimental monkeys by injections of oestrone in an oily solution. For this reason male sex hormone has been advocated in the treatment of benign prostate hypertrophy. Heckel (1940) reports a series of 22 patients in whom there was no clinical improvement following treatment with much larger than the conventional doses of testosterone propionate. Heckel also failed to observe any histological changes in the prostates of those treated by testosterone propionate from those not so treated. Sharpey-Schafer and Shackman, though they failed to find any significant histological change in the hypertrophied prostate of a patient who had received large doses of testosterone propionate, report that the prostate was macroscopically reduced to about one-third of its former size. Draper, Slaughter and Denslow (1941) recently treated 9 cases by alternate courses of injections of testosterone and of saline. Five showed marked improvement when treated with saline or testosterone. These authors conclude that there was no apparent improvement in the urinary status of these patients resulting from injections of testosterone which could not be duplicated by injection of sterile saline. As most of the criteria of response, such as frequency of micturition, are subjective and the symptoms notoriously subject to exacerbation and subsequent relief, it is difficult to evaluate the results of endocrine therapy. The dose recommended is 5 to 25 mg. intramuscularly two or three times a week.

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The author has recently used testosterone propionate in 3 cases of degenerative arthritis in men. In 2 out of 3 patients, there was both subjective and objective improvement. The swelling and the stiffness were diminished and the pain greatly ameliorated after the sixth injection of 25 mg. in one case and after the ninth injection in the second. Maintenance doses of 10 mg. are now being given to these patients for the last three months. In addition to the improvement in the joint symptoms both the patients report a sense of general well-being after the institution of treatment. The third patient, while he was less depressed mentally and thought his spirits were better, had no improvement in the joint symptoms. While no conclusions can be drawn from 3 cases only, the results appear to be sufficiently encouraging to warrant further trial of its use in this extremely difficult and refractory disease.

As a tonic.—Its use as a tonic, except where there is evidence of lack of development of testicular function or its failure in later life, is devoid of any scientific support.

B. In females

Chronic mastitis.—Loeser (1938, 1940) and Spence have reported successfully on the use of testosterone propionate in the treatment of chronic mastitis. These results have been generally confirmed by other workers.

The condition is characterized by pain and by nodular swelling of the breasts. A number of cases show microscopical evidence of epithelial proliferation, increase in number and cavitation of ducts and alveoli, and in the amount and nucleation of fibrous tissue. A similar histological picture is seen after prolonged therapy with large doses of oestrogens. The condition regresses on administration of androgens. The dosage recommended is 25 mg. intramuscularly twice weekly for a few weeks. As the treatment may be attended with certain undesirable manifestations such as growth of hair on the upper lip, deepening of the voice and enlargement of the clitoris, great care must be exercised in its use.

Spence (1940) has recently used local inunctions of an ointment of testosterone propionate in doses of 3 to 10 mg. daily, and reports excellent results from its use in the treatment of 8 patients with chronic mastitis; no undesirable results in the way of masculinization were encountered. Moreover the inconvenience of injections is avoided and the treatment is much cheaper.

Menorrhagia.—Zuckerman (1937) showed that injections of testosterone propionate in mature rhesus monkeys will succeed in arresting the menstrual cycle. He further showed that the cycle recurred normally on cessation of medication. Loeser (1938, 1940) used it successfully in a number of cases of menorrhagia. He thought that suitable doses could be used to induce atrophy of a normally functioning endometrium, or even of an endometrium in a pathological state resulting from too much oestrogenic stimulation. This action could be explained by supposing that it prevents the ovarian follicle from ripening by inhibition of the gonadotropic hormone. Mukherjee (1940) treated 9 cases of metropathia hæmorrhagica with encouraging results. Moderate cases of metropathic hæmorrhage were treated with 10 mg. of testosterone propionate by intramuscular injections every third day until the bleeding had stopped. Five milligrammes of the substance were then given twice weekly for two weeks and then once weekly for four weeks. The total dosage required was on an average 90 to 120 mg. Severe cases were treated essentially on the same lines, only bigger doses were employed. Thus the first two doses were 25 mg. each, while the subsequent dose was 10 mg. at each injection.

Pre-menopausal uterine bleeding.—Testosterone propionate has been used successfully for pre-menopausal uterine bleeding. The advantages claimed for it are:—

1. It obviates the need of applying radium or the use of *x*-ray, which is usually followed by severe climacteric symptoms.
2. It does not cause sudden and permanent amenorrhœa.
3. It does not require hospitalization and is therefore readily accepted by most patients.

Mazers treated 64 women, 48 of pre-menopausal age and 16 younger women with functional bleeding, with small doses of testosterone propionate intramuscularly every other day for one month. A total dosage of from 50 to 200 mg. given over a month was found to be effective and did not evoke any masculinizing changes.

Uterine fibromata.—There is no evidence, up to date, that injections of testosterone propionate have any definite value in the treatment of uterine fibroids. Loeser (1940) treated 5 patients with fibroids complicated by menorrhagia, by implantation of testosterone tablets. While the menorrhagia was beneficially affected, there was no effect on the fibroids.

Dysmenorrhœa.—Salmon, Giest and Walter treated 30 patients complaining of dysmenorrhœa, with injections of the male sex hormone. In 22 there was complete relief from pain, in 4 there was partial relief and in the remaining 4 there was no improvement. The dosage recommended is from 250 to 300 mg. of testosterone propionate during one cycle. In some cases the treatment was commenced during the first week; in others on the fifteenth or sixteenth day of the cycle. Rubinstein and Abarbanel treated 26 cases of dysmenorrhœa and found that, while the treatment was effective in

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essential dysmenorrhœa, there was little or no benefit in organic or anatomically determined dysmenorrhœa.

Precocious sexual maturity.—Mukherjee (1940) treated a girl, aged 8 years, with enlargement of the breasts, growth of hair in the axillæ and on the pubis, and onset of menstruation, by injections of testosterone propionate 5 mg. twice a week. After a total of 85 mg. the vaginal bleeding stopped, the labia shrank in size and the hair grew sparse. One case is, however, insufficient to draw any conclusions and further work is necessary to arrive at a correct evaluation of this type of treatment in precocious sexual maturity.

Frigidity.—As the treatment is known to increase sexual desire in women, it may be used cautiously in the treatment of frigidity.

Prolongation of pregnancy beyond term.—Mukherjee (1940) after experiments on guinea-pigs treated one case in a human being. The result was encouraging. If it is confirmed by future work we will have in testosterone propionate a drug which will combat habitual premature birth.

Inhibition of lactation.—Mukherjee (1940) treated 18 patients in whom suppression of breast secretion was deemed necessary because of still-birth, neonatal deaths and in one instance tuberculosis of the mother. Complete inhibition of breast milk was obtained in 8 patients in whom the treatment was commenced on the day of the delivery. On the other hand in 6 cases, where testosterone was given on the third day or after, little or no immediate effect was obtained. It would appear that testosterone propionate has little action on the activity of the mammary glands once the secretion has commenced. In 4 nursing mothers inhibition of milk was required one to three weeks after confinement because of neonatal death. In all of them treatment was only partially satisfactory and complete suppression of milk was not possible in spite of intensive treatment.

For an average case the initial dose was 25 mg. followed by 10 mg. at an interval of two days and then further two to six injections of 5 mg. at intervals of four to six days.

Otosclerosis in the female.—Bernstien and Gillis (1939) treated 38 unselected cases of otosclerosis with injection of testosterone propionate; 5 to 10 mg. were injected at weekly intervals for a course of 10 to 12 injections. Out of 38 cases treated, 24 improved. The authors conclude that there is some intimate connexion between the gonadal internal secretions and otosclerosis. It may be that there is in otosclerosis an imbalance between the male and female sex hormones, and this can be rectified by the administration of the deficient hormone.

(Concluded at foot of next column)

TYPHUS FEVER IN BURMA

(WITH RECORD OF THREE CASES)

By R. L. SONI, M.B., B.S., F.R.H.S.

KUNDU (1932) was the first to report typhus from Burma. The next year the second case came from Martin and Anderson (1933). These two cases stimulated investigation into the prevalence and distribution of typhus fevers in Burma. Maitra and Sen Gupta (1936) reporting the result of an investigation showed that 109 cases of typhus fevers distributed over 24 out of the 40 districts in the country were discovered during a period of two and a half years and that cases of 'scrub' and 'shop' typhus were seen to occur indiscriminately in rural and urban areas. Later, Kapila and Maitra (1937) reported a case of scrub typhus from Bhamo. No other cases have been reported from this country.

Our attention was first drawn to this fever in February 1935, when our clinical assistant (case 1) suffered from a continuous fever which on serological investigation was diagnosed as 'shop typhus'. This led us to investigate some of the similar cases seen within the three previous months and two out of these returned with a suggestion of typhus. Our second case occurred in 1936 and the third one in 1940. Brief notes from these three cases are given below :—

Case 1.—Clinical assistant, aged 24, complained of fever associated with severe headache and general aches and pains one evening. On examination, temperature was found to be 100°F., pulse 75 per minute full and regular, throat congested, eyes red and face flushed. The fever rose and continued, associated with relatively slow pulse, splitting headache, mental confusion and general restlessness. Bronchitis complicated the picture from the 3rd day and the patient complained of chilly sensation off and on. Blood films taken on the 5th day showed benign tertian malarial infection. Atebrin tablets were administered for 4 days: during this period the patient became delirious and noisy and he continued so for 5 days; on regaining consciousness he was apathetic. On the 10th day the temperature suddenly dropped to normal and he almost collapsed. Adrenalized glucose solution 50 c.cm. given intravenously resuscitated him. Temperature rose again

(Continued from previous column)

REFERENCES

BERNSTIEN, J., and GILLIS, L. (1939). *Lancet, ii,* 1368.

DRAPER, J. W., SLAUGHTER, G., and DENSLOW, C. (1941). *J. Urol.,* **45,** 539.

FINKLER, R. S., and COHN, G. M. (1941). *Ibid.,* **45,** 548.

FOSS, G. L. (1937) .. *Lancet, ii,* 1307.

HECKEL, N. J. (1940) .. *J. Urol.,* **43,** 286.

HUHNER, M. (1939) .. *Med. Rec.,* **149,** 366.

KENYON, A. T. (1938) .. *Endocrinol.,* **23,** 121.

LOESER, A. A. (1938) .. *Lancet, i,* 373.

Idem (1940) .. *Brit. Med. J., i,* 479.

MCCULLAGH, E. P. (1939). *J. Amer. Med. Assoc.,* **112,** 1037.

MUKHERJEE, C. L. (1940). *Calcutta Med. J.,* **37,** 633.

SPENCE, A. W. (1940) .. *Lancet, ii,* 387.

VEST, S. A., and HOWARD, J. E. (1938). *J. Urol.,* **40,** 154.

ZUCKERMAN, S. (1937) .. *Lancet, ii,* 676.

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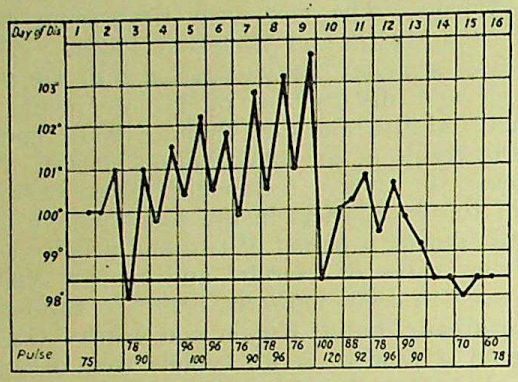
and came to normal by lysis on the 14th day and thereafter remained normal. No rash was detected. Treatment was mostly symptomatic and convalescence rapid.

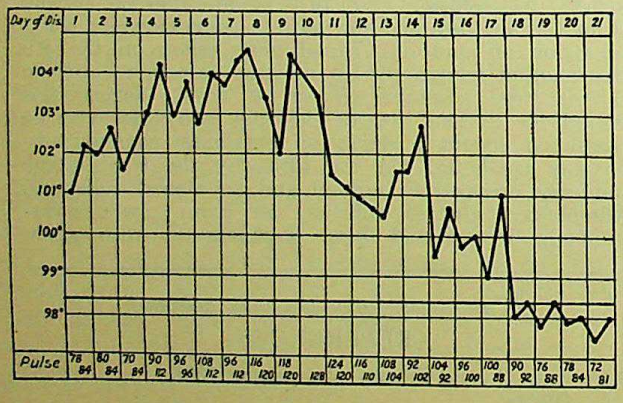
Case 1.



The patient was clean in his habits. No lice were detected on his person nor did he remember having been bitten by any insects, apart from mosquitoes, within a fortnight. However it may be noted that for 3 days, 10 days prior to the onset of fever, he had engineered and personally supervised an intensive rat drive.

Case 2.—Doctor, aged 33, was taken ill with slight shivering and severe dengue-like aches and pains. The temperature kept on rising and general restlessness became marked. On the 4th day, consciousness became dulled and towards evening the pulse was imperceptible but it improved with adrenalin administered intravenously. Retention of urine occurred during the 2 following days and the catheterized urine had a trace of albumin. Blood pressure at the time was 110 mm. Hg. systolic, 80 mm. Hg. diastolic. On the 6th day, a profuse rash, rather itchy, was noticed on the trunk and limbs, and the restlessness

Case 2.



became more marked. Heart, which had functional extra-systoles even in health, became more irregular the following day and towards evening the pulse again began to fail and unconsciousness supervened, but adrenalin once again set the condition right.

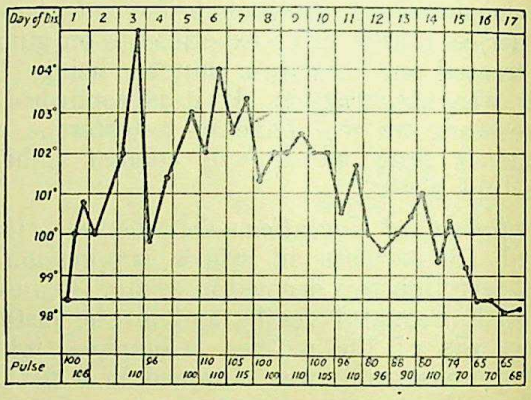
On the 8th day, in a semi-conscious condition, he was shifted to a hospital 70 miles south and 2 days later to Rangoon General Hospital, another 75 miles southward. Repeated examination of the blood showed no malarial parasites. Red cell count was 4,000,000 and leucocytes 4,000. The rash, quite diffuse on the back, had begun to fade by the 11th day. Treatment was mostly symptomatic.

On the 18th day the temperature dropped to normal and remained so thereafter. But, as the heart resented movements, becoming irregular even on sitting, another five weeks had to be spent in bed. Quinidine in small doses was helpful. Apart from musculo-spiral neuralgia (right side) which occurred at this stage the improvement was steady. Later, a change to the hills for a couple of months rapidly recuperated his health.

There were no lice on the patient, nor history of any special insect bite.

Case 3.—Female, aged 20 years, had a complete abortion in the third month and was feeling quite comfortable. Six days later she felt slightly indisposed: she had slight cold and temperature was 100°F. The next day she passed a large clot *per vaginam*. The temperature kept on rising and on the 3rd day it suddenly went up to 105°F. Vaginal examination revealed loaded rectum, profuse leucorrhœa unstained with blood, os closed and uterus in normal position though soft. An enema relieved her of pain in the lower part of abdomen. Urine was found free from albumin and blood examination revealed no malarial parasites. Hæmoglobin at this stage was 80 per cent. Though in view of the antecedent abortion attention was focused on the uterus, it was considered advisable to 'wait and watch' and avoid intervention for the time.

Case 3.



The next morning temperature dropped to 99.8°F. but rose again and followed a continuous course for another 12 days, by the end of which period it arrived at normal by lysis and remained normal after that.

A roseolar rash was noted on the trunk on the 6th day. The eruption was scanty and short-lived. There was no marked restlessness at any stage, abdominal reflexes were sluggish in the second week and towards the end of that week anæmia was appreciable and hæmoglobin was found 45 per cent on the 14th day.

Prontosil album tablets orally and omnadin intramuscularly were used besides the symptomatic treatment. Toxæmia was not appreciable in this case, nor was there any mental confusion. In fact the patient was, except on the 3rd, 4th and 5th days of the disease, quite comfortable and cheerful throughout. To combat the rapidly developing anæmia she was put on liver extract and iron orally. Convalescence was rapid and uneventful.

To save space, additional information on the three cases is given in the appended table and temperature charts.

Comments.—The onset in the first two cases was marked by severe headache and distressing aches and pains in limbs and back, but in the third case there was only slight cold and indisposition to begin with. The toxæmia, restlessness, muscular prostration, mental confusion and delirium that followed were found to be in direct proportion to the initial aches and pains. The severity of these symptoms, however, appeared to have no relation to the height of temperature, for in the third case though temperature was high and sustained, these distressing symptoms were absent or extremely mild. Whether the comfortable course in the third case was due to the

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mild onset or to the use of the prontosil album tablets it is hard to say. Omnadin was administered in the second and the third cases : it had practically no influence on the course of the second case: it is just possible it had no influence on the third even. If prontosil was responsible for the comfortable course in the third case, it was anyway definite that it had no appreciable influence on the temperature chart. Rather it could be held responsible for the anæmia that was noted to develop in that case following its use.

A study of the temperature charts is also of interest. All the three charts depict more or less continuous temperature interrupted by a sort of transient pseudo-crisis occurring a few days in advance of the actual termination by lysis or crisis. The pseudo-crisis was quite marked in case 1. Moreover in that case the undulations on the temperature chart from the 2nd to the 9th day are quite suggestive of the malaria complicating the picture. The acute peak, so very prominent in the temperature chart for case 3 on the 3rd day, may be due to some toxins released into the general circulation by the contraction of the uterus following the expulsion of the last remaining clot from its cavity.

It is also of interest to note that the abortion preceded the onset by 6 days in case 3; this was a serious trap to mislead diagnosis. A medical case could easily be mistaken for a serious obstetric emergency.

The rash was not a constant feature in these cases. It was profuse in case 2, mild in case 3 and absent in case 1. In none of the cases were lice detected, nor was there history elicited of any special insect bite for a fortnight preceding the onset. In case 1, the rat drive 10 days prior to the onset is of some interest. Goyal (1941) describes an enzootic of typhus fever in wild rats of Calcutta. Though the rat strain he worked with was considered non-pathogenic to man, it is just conceivable that there may be strains in rats of some localities pathogenic to men.

Acknowledgments.—Our thanks are due to the Pasteur Institute, Rangoon, for examining the sera for Widal and Weil-Felix tests, and also to the authorities of the Rangoon General Hospital for permission to use the hospital records of case 2.

TABLE

Results of laboratory investigations

Case number	Day of disease when examination done	Widal tests	Laboratory findings: Urine: Reaction	Urine: Albumin	Urine: Russo reaction	Urine: Diazo test	Weil-Felix tests: OXK	Weil-Felix tests: OX19	Weil-Felix tests: OX2	Additional notes
1	5th ..	..	Ac.	—	+	—	..	..	..	Malarial parasites also found.
	12th ..	..	Ac.	++	++	++	..	..	..	
	16th ..	..	Ac.	+	+	++	..	..	..	
	18th ..	—	..	..	..	..	+1 : 34	+1 : 340	+1 : 64	
2	6th ..	..	Ac.	+	+	—	..	..	..	
	8th ..	—	Al.	+	..	..	−1 : 50	−1 : 50	−1 : 50	Tenth day urine examination revealed epithelial cells, some pus cells, but no casts.
	10th ..	..	Ac.	+	..	..	..	..	..	
	14th ..	T + 1 : 600 TO + 1 : 100 A + B —	..	..	..	..	+1 : 30	+1 : 375	+1 : 750	
3	4th ..	..	Ac.	—	+	—	..	..	..	
	6th ..	..	Ac.	—	+	—	..	..	..	Hæmoglobin percentage on 6th day = 80 per cent.
	10th ..	—	..	..	..	..	−1 : 50	+1 : 300	−1 : 50	
	12th ..	..	Ac.	—	—	+	..	..	..	Hæmoglobin percentage on 14th day = 45 per cent.

REFERENCES

GOYAL, R. K. (1941) .. *Indian Med. Gaz.*, **76**, 84.

KAPILA, C. C., and MAITRA, G. C. (1937). *Ibid.*, **72**, 417.

KUNDU, M. L. (1932) .. *Ibid.*, **67**, 390.

MAITRA, G. C., and SEN GUPTA, P. N. (1936). *Ibid.*, **71**, 572.

MARTIN, C. DE C., and ANDERSON, L. A. P. (1933). *Ibid.*, **68**, 432.

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BOILS AND CARBUNCLES: THEIR TREATMENT BY *X*-RAYS

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THESE frequent and unwelcome visitors are always due to an infection. The greatest preventative is constant cleanliness. The back of the neck is the most frequent place, in men, for boils and carbuncles to occur, as in this situation the skin is coarse and ill-nourished and in some cases abrasions caused by a stiff collar encourage invasion by micro-organisms. Diabetes particularly predisposes to boils and carbuncles. Carbuncles are more frequent in old than in young men; they develop more often on the back of the neck than on any other part of the body.

Carbuncles and boils on the cheeks, upper lip and nose are particularly dangerous, owing to the risk of cavernous sinus thrombosis *via* the facial and ophthalmic veins, or the deep facial vein and the pterygoid plexus.

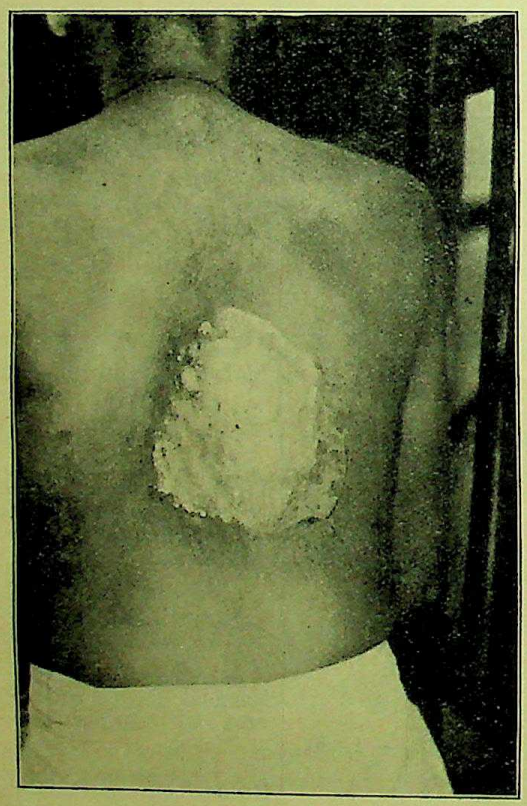

Fig. 1.

It is practically impossible in the beginning to determine in most instances that a patient has a carbuncle. An apparent boil may develop into several boils, with several openings, and become a carbuncle. The patient complains of tenderness and stiffness at the site of origin of the carbuncle. The subcutaneous tissues become painful and indurated, and the overlying skin is red. Gradual extension occurs and after a few days areas of softening appear. The skin then gives way and thick pus and sloughs discharge. The condition sometimes extends widely, and fresh openings appear in the skin, and tend to coalesce with those previously formed.

Treatment

Treatment consists, in the first place, in local cleanliness, improving the general resistance of the patient by means of tonics, fresh air, ultra-violet rays and vaccines.

Pusey and Ormsby consider *x*-ray therapy a very valuable method of treatment in recurrent furunculosis in circumscribed areas. Röentgen therapy gives such excellent results in carbuncles and boils that in my opinion it should be the treatment of choice, particularly in those which are considered bad surgical risks. The beneficial effect of irradiation on lesions of this character—furuncle, carbuncle, cellulitis, phlegmon or abscess of soft tissues—especially when treated early, before the stage of suppuration, has been demonstrated by many workers. It is surprising that the value of such a simple and

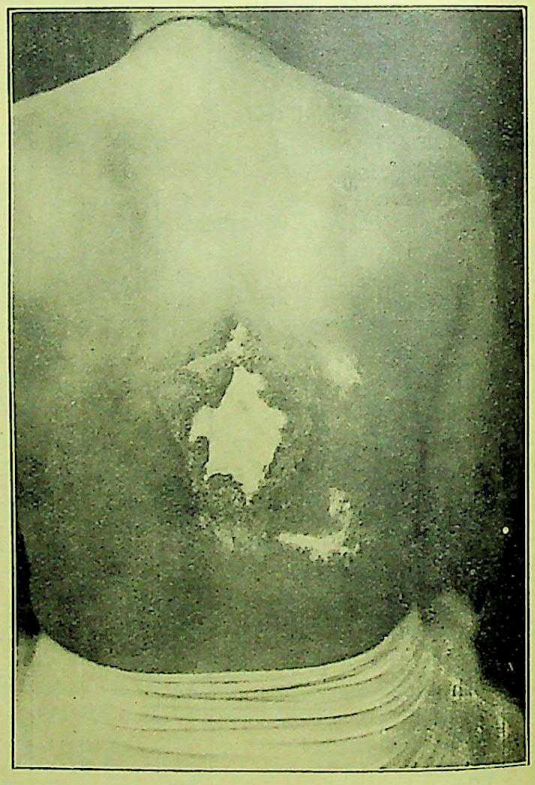

Fig. 2.

effective treatment is not generally realized by the profession.

The rapidity of improvement, the relief of pain and the abortion of the development and regression of the inflammatory process are all so striking and spectacular by *x*-ray treatment that they have to be seen to be believed. Prompt and marked benefit is derived in most cases. Pain is relieved in about 24 hours, but in a small percentage of cases this relief may be preceded by a temporary increase

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in the pain. The treatment is most effective during the early stages when other methods of treatment are least effective; it is painless and inexpensive and does not interfere with a patient's activities; it often relieves pain in a few hours, makes hot or other dressings unnecessary, or shortens the period during which they must be applied; it often obviates an operation; and it yields a better cosmetic result.

The dose of *x*-ray should preferably be small, and usually a single exposure is sufficient. In cases which do not react promptly to the initial exposure, the treatment may have to be repeated at intervals, depending on the dose, which may vary between 25 and 75 per cent of an erythema skin dose. The quality of the rays should be graded according to the depth and thickness of the lesion. With such doses there should not be any skin or general systemic reaction; therefore, the treatment may be given to weak and febrile patients without danger. Irradiation

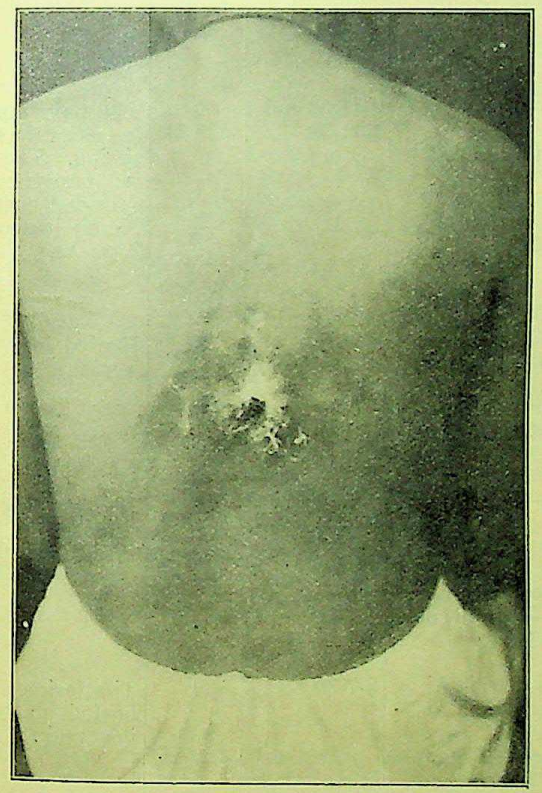

Fig. 3.
M.S. Case 374.—A case of carbuncle showing the result of *x*-ray treatment.

during the suppurative stage is less effective, but even then it may relieve pain and may shorten the course of the inflammatory process. Carbuncles treated in the early stages will rapidly localize, cease to extend and readily permit surgical drainage.

Technique

I have collected here some of the techniques adopted by various authorities and the results achieved by them, in treating boils and carbuncles.

In single boils and carbuncles MacKee and Niles claim to have obtained good results with a single dose of 230 *r* of *x*-rays filtered with 3 mm. of aluminium. Goyle has obtained remarkable results by the use of intensive filtered radiations in carbuncles. Dunham obtained prompt cures in 11 cases of carbuncles with the same technique. Ruggles confirms Dunham's work, obtaining quick cures in both boils and carbuncles. Dunham has obtained excellent results with similar treatment in cases of streptococcal palmar abscess.

Leddy and Morton state that when a lesion is in the indurated stage before suppuration has set in, *x*-rays cause rapid regression in about 50 per cent of the cases and considerable relief in the remainder. They had 74 cases of boils and 26 cases of carbuncles. They found that boils responded much better and more rapidly than carbuncles. They used 135 kv., 4 mm. al. filter 16-inch distance, 5 ma. for 10 minutes for boils and the same factors for 15 to 18 minutes for carbuncles. They found that irradiation of affected areas prevents the infection of other follicles. Desjardins believes that radiotherapy may render surgery unnecessary and that small doses (10 to 15 per cent erythema dose) give the best results.

Baensch treated 103 cases of furuncle of the face with *x*-rays and the same number of cases with other measures. The mortality in the irradiated cases was 1.9 per cent and in the others 10.7 per cent. In a few hours after treatment, the pain stopped and the temperature fell. The time required for treatment was shortened and there were no recurrences in the treated area. His dosage was 150 to 250 *r* filtered with 0.5 mm. zinc and 3 to 5 mm. of aluminium at 30 cm. focal distance.

Firor reported on 56 carbuncles treated with *x*-rays, in only one of which was excision required. He found that smaller doses were just as successful as large.

Hodges believes that in furuncles filtered *x*-rays give better results than small doses of unfiltered, low-voltage *x*-rays. He uses doses of 125 *r* at 125 kv. filtered with 4 to 6 mm. of aluminium at 10 inches distance for several weekly treatments and with this method causes disappearance of existing furuncles and almost always aborts newly-forming ones. With carbuncles, on the other hand, he considers that small doses (100 *r* at 85 kv.) of unfiltered rays for two or three treatments give the best results. Irradiation limits the spread of the lesion, lessens pain, increases drainage, shortens the course and lowers the mortality.

Meyer reports on 50 cases of furunculosis of the lip, which were treated with *x*-rays, without a failure or mishap. A single dose of 100 to 200 *r* at 100 kv. was applied through a 1 to 5 mm. of aluminium filter and occasionally a second dose was given on the third day.

I have recorded here a series of 20 cases of carbuncles and boils treated by me during the

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TABLE

Record of cases of boils and carbuncles treated by x-rays at the Röentgen Clinic, Allahabad, during the last 2½ years

Register number	Name	Age	Sex	Clinical history and findings	Diagnosis	Details of x-ray treatment	Dates on which the treatments were given	Total number of sittings given in each case	Results
61	M.P.	63	M.	Painful swelling of the whole of the right hand and wrist and high fever (103°–104°). Two weeks ago had a prick with a bamboo chip.	Cellulitis	Filters—1.0 mm. Al. Current—4 ma. at 100 kv. Distance—30 cm. Dose—250 *r*.	5-10-38 and 8-10-38.	2	Pain subsided after the first sitting. Fever and swelling gradually went down.
80	K.P.	20	F.	Painful hard swelling on the lateral aspect of both the arms and high fever—duration 2 weeks.	Abscess	Factors the same as above. Dose—100 *r* to each area.	30-10-38 and 1-11-38.	2 each	Complete regression in 10 days.
94	G.	50	M.	A big painful hard swelling in the right gluteal region and high fever. Size of the swelling about 8 inches in diameter. Duration—10 days. Diabetes—1½ years	A big abscess or an early case of carbuncle with diabetes.	Filters—0.3 cu. + 1.0 Al. Current—4 ma. at 150 kv. Distance—30 cm. Portal—8 × 10 cm. Dose—150 *r*.	4-11-38 and 6-11-38.	2	The pain was less after the first sitting. The inflammation subsided completely in about 2 weeks.
214	P.D.	43	M.	A big swelling on the back near the neck with several small openings and fever 10 days. Diabetic.	Carbuncle with diabetes.	Filters—4 mm. Al. Current—4 ma. at 150 kv. Distance—30 cm. Dose—200 *r*.	3-3-39	1	Healed in 2 weeks.
326	S.K.G.	42	M.	A big painful hard swelling on the chest in the right subclavicular region and high fever—one week.	Deep abscess.	Filters—0.5 cu. + 1.0 Al. Current—4 ma. at 180 kv. Distance—30 cm. Portal—8 × 10 cm. Dose—175 *r*.	2-7-39 and 5-7-39.	2	The swelling subsided in about 2 weeks.
327	B.C.	20	M.	A swelling about 1 inch in diameter on the nape of the neck with several small openings.	Carbuncle	Filters—4 mm. Al. Current—4 ma. at 150 kv. Distance—30 cm. Dose—200 *r*.	8-7-39	1	The lesion healed up in a week.
330	B.K.B.	58	M.	A big painful hard swelling (about 6 inches in diameter) on the back near the neck with innumerable small openings. Fever present (sent by Capt. R. C. B.).	Do.	Filters—0.5 cu. + 1.0 Al. Current—4 ma. at 180 kv. Distance—30 cm. Portal—8 × 10 cm. Dose—200 *r*.	3-7-39 and 6-7-39.	2	The pain subsided after the first dose, the swelling gradually shrivelled up and became softer. A week later the attending doctor made a small opening to allow drainage of the pus. The patient made an uneventful recovery.

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TABLE—*contd.*

Register number	Name	Age	Sex	Clinical history and findings	Diagnosis	Details of *x*-ray treatment	Dates on which the treatments were given	Total number of sittings given in each case	Results
333	H.C.M.	30	M.	A red angry looking swelling on the right shoulder. Size 2 inches in diameter. In the centre shows several minute openings. Fever present. No sugar in urine.	Carbuncle	Filters—4 mm. Al. Current—4 ma. at 150 kv. Distance—30 cm. Portal—small. Dose—200 *r*.	8-7-39 and 10-7-39.	2	The pain was relieved after the first sitting. The swelling gradually subsided and the wound healed up in about 2 weeks.
339	R.D.S.	75	M.	A huge red swelling on the back with numerous openings. Duration—2 weeks. Fever present.	Do.	Filters—0.5 cu. + 1 mm. Al. Current—4 ma. at 180 kv. Distance—30 cm. Portal—8 × 10 cm. Dose—200 *r*.	14-7-39 and 16-7-39.	2	The swelling gradually subsided and the whole thing healed up in about 6 weeks.
374	M.S.	60	M.	A huge red swelling on the back with many small openings—13 days, high fever. Urine—free from sugar.	Do.	Filters—0.5 cu. + 1 mm. Al. Current—4 ma. at 180 kv. Distance—30 cm. Portal—8 × 10 cm. Dose—175 *r*.	10-8-39 12-8-39 19-8-39 and 23-8-39.	4	Healed up in 6 weeks.
398	M.K.	55	M.	A painful swelling of the left middle finger and hand—discharging pus. Duration—6 weeks. He was operated twice and is a diabetic (sent by Dr. Ajmal Khan).	Cellulitis and osteomyelitis (the latter condition was verified by *x*-ray examination).	Filter—0.3 cu. + 1 mm. Al. Current—4 ma. at 150 kv. Distance—30 cm. Portal—8 × 10 cm. Dose—125 *r* weekly.	5-10-39 12-10-39 19-10-39 and 26-10-39.	4	Made a complete recovery without any further surgical aid.
494	K.L.	16	M.	A painful swelling near the anus—2 months.	Abscess (ischio-rectal).	Filter—0.3 cu. + 1.0 Al. Current—4 ma. at 150 kv. Distance—30 cm. Portal—8 × 10 cm. Dose—125 *r* weekly.	3-1-40 10-1-40 17-1-40 and 24-1-40.	4	The swelling subsided completely and has not recurred since.
580	A.A.	50	M.	A big red swelling on the right temporal region with many small openings in the centre. Size 4″ × 3″—11 days. Sugar in urine.	Carbuncle	Factors as above. Dose—150 *r*.	20-4-40	1	Made an uneventful recovery.
622	R.S.	40	M.	A painful swelling of the palm of the left hand with fever—12 days.	Palmar abscess.	Factors as above. Dose—150 *r*.	17-6-40 and 19-6-40.	2	Swelling and pain subsided completely.
623	B.N.S.	65	M.	A big painful swelling in the right gluteal region—1 week. High fever.	Abscess	Factors as above. Dose—200 *r*.	18-6-40	1	The pain was much less after the irradiation and the abscess burst 2 days after.

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TABLE—*concld.*

Register number	Name	Age	Sex	Clinical history and findings	Diagnosis	Details of *x*-ray treatment	Dates on which the treatments were given	Total number of sittings given in each case	Results
707	S.S.	45	F.	A very painful red swelling on the tip of the nose and high fever.	Boil	Filter—1 mm. Al. Current—4 ma. at 100 kv. Distance—30 cm. Portal—small. Dose—150 *r*.	6-9-40	1	Marked relief and complete regression.
741	R.B.	50	M.	Painful swelling in the right axillary region.	Abscess	Filters—2 mm. Al. Current—4 ma. at 120 kv. Portal—8 × 10 cm. Dose—200 *r*.	14-10-40	1	Relief in pain. The abscess was subsequently opened for draining pus.
812	B.	39	M.	Painful swelling in the region of the left parotid and fever—1 week.	Do.	Filters—0.3 cu. + 1 Al. Current—4 ma. at 150 kv. Distance—30 cm. Portal—8 × 10 cm. Dose—150 *r*.	10-1-41 and 14-1-41.	2	Subsided completely.
832	H.S.	50	M.	A painful swelling in the left leg with several minute openings—no sugar in the urine.	Carbuncle	Factors and dosage as above.	3-2-41	1	Subsided gradually.
836	S.N.G.	35	M.	A painful swelling on the tip of the nose.	Boil	Filters—1 mm. Al. Current—4 ma. at 100 kv. Distance—30 cm. Portal—small. Dose—125 *r*.	5-2-41	1	Pain and swelling subsided in 24 hours.

last two and a half years, by *x*-rays. I admit that the number is too small to make any sweeping statement about the success of this treatment, but I was struck with the rapidity of improvement, the relief of pain, and the regression of the inflammatory process in these cases. The cosmetic result was extremely good and the healing was quicker than could be expected by any other means, including surgery.

The accompanying photographs show the result of *x*-ray treatment in one of my cases of carbuncle recorded here.

I am convinced that with *x*-ray treatment the involution occurs more quickly, the amount of necrosis is decreased, liquefaction takes place more rapidly and is less extensive, and the course of the disease is greatly decreased and at times aborted entirely, when treatment is given sufficiently early.

Mode of action of x-rays in such inflammatory conditions.—Various explanations have been advanced to account for the favourable influence of *x*-rays on inflammatory conditions and the multiplicity of such explanations probably has led many physicians to discredit the clinical evidence or to ascribe it to over-enthusiasm of the *x*-ray therapist. Indeed, without a satisfactory and convincing explanation it would be difficult to believe that the same agent can be therapeutically effective against so many different forms of inflammation in different organs or parts of the body. And yet the reason appears to be quite simple and to rest on sound and abundant experimental facts. For radiation to act in much the same way, and at the same time on so many forms of acute inflammation, the lesions must have some common factor. Now, what may this factor be?

The exceptional radio-sensitiveness of certain leucocytes, notably the lymphocytes, has been demonstrated and established by the early experiments of Heineke and has since been fully confirmed by many others. All the clinical circumstances indicate that inflammatory lesions respond to irradiation in proportion to the degree of leucocytic infiltration, and that the rays act primarily by destroying the infiltrating cells. In favour of this view are the experimentally proved sensitiveness of lymphocytes on the one hand, and on the other hand the fact that the

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rate of regression of acute inflammatory processes corresponds to the rate at which lymphocytes are known to be destroyed by irradiation.

The rapidity with which the symptoms often abate and the physical signs disappear after exposure to a small or a moderate dose of *x*-rays indicate that the destruction of lymphocytes is the primary and direct result of irradiation. The lymphocytes are the only cells in the body, except the basal epithelium of the salivary glands, which react to irradiation in such a short time and at such a rate. Also variation in the degrees of leucocytic infiltration in different patients may explain the partial or complete failure of irradiation in some cases. If it can be assumed that the leucocytes which the organism mobilizes around the site of infection represent an effort to localize the infection and to dispose of the infectious material, it must also be assumed that the infiltrating cells contain or elaborate within themselves the protective substances which enable them to destroy or neutralize the bacterial or other toxic products which give rise to the inflammation. If these assumptions are well founded it seems reasonable to deduce that irradiation, by destroying the infiltrating leucocytes, causes the protective substances contained by such cells to be liberated and to be made even more readily available for defensive purposes than they were in the intact cells.

Conclusion.—The evidence of the therapeutic value of *x*-ray treatment in acute inflammatory conditions like boils and carbuncles is so abundant and so generally favourable that one wonders why this method of treatment is not more widely used. Perhaps the very multiplicity of inflammatory lesions in which *x*-ray therapy has been claimed to be effective has led to not unnatural scepticism; or failure to utilize the treatment may be due to an excessive fear of ill-effects—a fear probably springing from reports of *x*-ray injuries incurred during treatment of malignant tumours with very large doses of *x*-rays, or from systemic reactions which so often follow irradiation for conditions requiring prolonged exposures. But in view of the short exposure and small doses required for acute inflammatory lesions, such as those mentioned in this paper, such fears have no basis.

BIBLIOGRAPHY

KAPLAN, I. I. (1937) .. *Radiation Therapy.* Oxford University Press, London.

MACKEE, G. M. (1938). *X-Rays and Radium in the Treatment of Diseases of the Skin.* Henry Kimpton, London.

MOCK, H. E., PEMBERTON, R., and COULTER, J. S. (1934). *Principles and Practice of Physical Therapy*, 3. W. F. Prior Co., Haggerstown.

POHLE, E. A. (1938) .. *Clinical Röentgen Therapy.* Henry Kimpton, London.

SULFANILAMIDE IN ASCITES. UNDER WHAT CONDITIONS MAY THIS DRUG ACT AS A DIURETIC ?

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PRONTOSIL and the related sulfanilamide substances have been tried in a very great variety of conditions since these drugs were introduced into clinical medicine, and they have been found very useful in many of these disease conditions. The literature on this subject has become quite voluminous. However, in that part of the literature which has come to our attention, there has been no discussion on the use of sulfanilamide in the treatment of ascites, nor have we found any mention of a diuretic action of this drug, which could be used in treatment, or of such an action appearing as a complication of its use for some other purpose.

Our interest in these problems started during our observation of the following case :—

Case 1.—Male, age 10. Admitted 15th October, 1937.

Chief complaints.—Distension of abdomen for 1½ months, much worse for 8 days. Pain in the abdomen, chiefly on the left side for 1½ months. Difficulty in breathing, and increasingly scanty urine for 1 week.

Family history.—Father, two sisters and one brother living and well. Mother died with swelling of whole body.

Past history.—Occasional colds and headache, dysentery and fever with chills were the diseases remembered, but the age at which these occurred was not known exactly by the father. There was also the history of the trouble which apparently led up to the present complaints. Five months before his admission, the boy fell from a car and developed pain in the right lower abdomen. After trying home remedies, the father brought him to this hospital. A tentative diagnosis of acute appendicitis following trauma was made, but since the hospital surgeon was on leave the boy was sent to another hospital. There he was given worm treatment and passed six roundworms. Two days later this treatment was repeated, but no more worms were passed.

Instead, the pain increased and a small swelling appeared in the right lower quadrant which persisted for 15 days. He was treated medically, the pain subsided and he went home. Two days later the pain returned and this time some indigenous remedies were used and the pain later subsided. For one month he was apparently well.

Present illness.—After this interval of one month the present symptoms started. This time the pain in the abdomen was more or less general, but sometimes it was localized on the left side and around to the back, and it was accompanied by slight distension of the abdomen. He was treated first at the local dispensary for 10 days and then at the headquarters hospital of the department in which his father worked. There he stayed 2 weeks, and during that time he was given medicine by mouth following which he had 2 or 3 watery motions a day—and also 6 injections in the arm. The pain decreased slightly but the distension did not diminish.

Physical examination on admission showed a boy of about 10, chronically ill, poorly nourished and thin, except for a markedly distended abdomen and œdematous legs and feet. Though he had no fever, his

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pulse rate was 136 and his respiration rate 30. The chief findings were: moderate enlargement of submaxillary, jugular and posterior cervical glands, not tender, and discreet; heart rate rapid, 'tick-tack' rhythm, aortic second sound very loud, no murmurs; bases of lungs dull and few moist râles; abdomen symmetrically distended, girth—29 inches at umbilicus, measurement from xyphoid to pubis—13 inches, a number of distended veins over upper abdomen in midline and at sides, fluid thrill and shifting dullness, impossibility of palpating liver or spleen because of the tenseness of the swollen abdominal wall; œdema of legs and feet, but not of face or upper extremities.

Our impression at the time of admission was that the boy might have either cirrhosis of the liver or tuberculous peritonitis; our findings later modified this impression, but we are still somewhat in doubt as to the correct and complete diagnosis. The laboratory findings, treatment and clinical course while in the hospital are given in the accompanying table in some detail, since they have a bearing on our discussion of this case and the others that follow.

TABLE. CASE 1

Date	Leucocyte count	Treatment			Remarks
		Sedatives	Diuretics	Other treatment	
15-10-37	..	Bromides	..	..	
16-10-37	18,800	Bromides Hot water bag.	Salyrgan, 1 ampoule.	Cod-liver oil	Salyrgan, because previous urine report was negative.
17-10-37	..	Morphine	„	..	
18-10-37	..	Morphine Hot water bag.	„	..	Only slight reduction in swelling so salyrgan continued.
19-10-37	..	„	„	..	
20-10-37	16,000	„	„	..	
21-10-37	..	„	Ammonium chloride.	..	Salyrgan stopped, very little effect.
22-10-37	..	„	„	Paracentesis of abdomen	Six pints straw-coloured fluid removed.
23-10-37	..	„	„	Cod-liver oil	
24-10-37	..	„	„	„	
25-10-37	18,400	..	..	..	
26-10-37	..	Morphine Hot water bag.	..	Prontosil-album 1 tablet (0.5 gm.) t.i.d. daily until 8-11-37.	Abdomen again rapidly filling, pain in same. No fever.
28-10-37	..	Codein	..	..	Reduction in pain and swelling.
1-11-37	10,400	..	..	..	
2-11-37	..	Aspirin	..	..	Temperature 102°F. for 1 day only. Ferradol given for 5 days. Marked reduction in swelling.
7-11-37	..	..	..	Prontosil-album 1 tablet (0.5 gm.) b.i.d. daily until 26-11-37.	
9-11-37	..	..	..	..	
11-11-37	..	..	..	..	
13-11-37	8,600	..	..	..	Increased appetite. Gain in weight.
20-11-37	..	..	..	..	
26-11-37	..	..	..	..	Stool examined, no ova or cysts.
27-11-37	..	..	..	Prontosil-album stopped Cod-liver oil	Kahn, just plus.
1-12-37	15,600	..	..	Cod-liver oil, calcium lactate, yeast.	
22-12-37	..	..	..	..	Discharged.

Several points are worthy of special attention. There was no fever associated with the leucocytosis. The white blood count was reduced during administration of sulfanilamide and elevated after it was stopped. There was no favourable effect following salyrgan, and apparenly there was irritation of the kidneys by it (slight trace of albumin, granular casts and both red and white cells). This subsided, however, during the treatment with sulfanilamide. Pain in the abdomen was markedly reduced within 2 days after starting prontosil-album, and the œdema and ascites showed reduction at the same time. By 27th November the boy seemed to be cured, and therefore the sulfanilamide was stopped. However, the boy was kept in the hospital until 22nd December, with the idea of allowing him to gain weight and strength, but also that we might see how he would progress after the sulfanilamide had been withdrawn. We did not see any reason for giving it again, but it is interesting that about a week after we had stopped this drug, the boy began to ask why we were not giving him those pills. We wondered whether it might be habit-forming. We had seen no report of this in the literature. He also occasionally complained of pain in the abdomen, but there were no objective signs of any trouble. However by 1st December, 5 days after sulfanilamide had been stopped, the white blood count had gone up to 15,600. We did not know how to explain this. Also without apparent explanation was the single rise in temperature during

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his whole stay in hospital. This was on 7th November. It rose to 102°F., and returned to normal within 24 hours.

We had witnessed what seemed to be a rather remarkable cure of ascites. But ascites is not a primary disease, and we did not have any definite idea of the ætiology of the condition in this case. We did not at the time consider any diuretic action of the drug, for though the excess fluid must have been eliminated through the kidneys, there had been nothing spectacular about it, as there is at times with salyrgan and similar diuretics. We tended rather to the view that this had been a chronic infection, perhaps a chronic peritonitis, and that the sulfanilamide in overcoming the causative agents of this had brought about a cure.

The boy returned a few weeks after discharge, complaining of recurrence of pain in his abdomen, but without any swelling. He came asking for 'those white pills'. It was impossible for his father to keep him in the hospital long, so we had to be content to follow him as an outpatient. We gave some more sulfanilamide, 3 tablets, and then 2 tablets a day for about 2 weeks. His symptoms were entirely relieved, and he has had no further recurrence of them, and has been perfectly well at the various times when we have seen him or had reports of him.

Case 2.—Hindu male, age 45 years. He was admitted on 25th November, 1938, and remained until 11th January, 1939.

History.—For one year he had had burning on micturition, and had passed blood occasionally. He took several native medicines including mercury. One month before admission after taking mercury he had swelling of the gums and fever for 10 days and then swelling, first of the face and then of the feet and abdomen, and slight diminution of the quantity of urine. The swelling of the face and feet diminished after 10 days, but the swelling of the abdomen has been steadily increasing. For the last 3 weeks there was almost no burning on urination.

Physical findings.—A middle aged man who is pale, emaciated, but has a markedly swollen abdomen, which is, however, not painful. Fluid thrill and shifting dullness present in abdomen, but liver and spleen not palpable. No swelling of face or feet, and heart and lungs seem to be normal.

Laboratory findings.—Urine: 25th November. Trace of albumin, few pus cells and few red cells. 29th November. No albumin and no red cells. Urine sediment, no gonococcus or tubercle bacilli. Stool, nothing abnormal found. Kahn, negative. Hæmoglobin 60 per cent.

Treatment.—Started prontosil-album 4 days after admission. [The dose in this and other cases has usually been 1 tablet of 0.5 gramme (7½ grains) every 4 hours, a daily total of 3 grammes (45 grains). This is usually continued until results are obtained, unless there is any reaction or unless the period exceeds 2 or 3 weeks, and the dose is then reduced to 2 grammes a day or less.] In this case the actual dosage was 6 tablets a day for 2 days, 4 a day for 9 days, and then 6 a day for 5 days.

During this time the swelling of the abdomen had largely disappeared, but he continued to complain occasionally of burning on urination, which became even worse when the fluid seemed to have largely disappeared from the abdomen. Thinking then that it was possible that he had tuberculosis in the kidneys, though the treatment had been effective against a secondary infection, we cystoscoped the man on 14th December, planning to catheterize his ureters and examine the urine specimens from the kidney pelves. We were surprised and chagrined to find a stone in the bladder. This was removed by suprapubic cystotomy on 20th December. The delay after the diagnosis was made was because of the reluctance of the man to submit to operation when he had witnessed so much improvement in his original condition with medical treatment.

The sulfanilamide had been stopped on 14th December, but even after the stone was removed, the man complained of some pain in the abdomen and a little burning on urination. It was therefore given again from 27th December 6 tablets a day for 4 days, 4 a day for 9 days and then 3 a day until discharged on 11th January, 1939.

The decreasing of pain while the abdomen was filling up and the increase in pain again while the ascites was disappearing were probably related to the amount of activity of the bladder. With the diuresis, which apparently accompanied the loss of the abdominal fluid, the bladder was more active, and the stone irritated more. Here again we did not notice anything spectacular about the diuresis, but this patient, like the first one, asked for the pills when he was not feeling well, and he felt better when he was taking them.

Our impression at the time this patient was discharged was that the effect of the sulfanilamide had been to clear up a chronic urinary tract infection, after which the kidney function, which had been damaged also by the mercury, had improved and the ascites had therefore disappeared. We could not say whether the stone had developed before or after the urinary tract infection.

Case 3.—Mohammedan male, age 60. This man was admitted on 20th January, 1939, and discharged on 17th February, 1939.

History.—Fever for 2 months, at first with chills, and later without. No unusual urinary symptoms. The abdomen had been distending gradually for a month before admission, and was so tight at the time when he came to the hospital that he was having difficulty in breathing and also in eating. Much general weakness.

Physical examination.—Emaciated and somewhat anæmic. Heart seemed in good condition for his age and condition, lung bases were dull with diminished breath sound. The abdomen was distended, liver palpable but spleen not felt. Rectal examination showed a small hard nodule in middle lobe of the prostate which was not enlarged.

Laboratory findings.—Urine, albumin trace. Stool, roundworm and hookworm ova. Hæmoglobin 55 per cent. Kahn ±. White blood cell count 6,800.

Treatment.—Roundworm treatment was given on the second day. The hookworm treatment was postponed because it was hoped to improve his condition first. Prontosil-album was given from 24th January, 1939—6 tablets a day for 9 days, and 4 a day for 9 days. There seemed to be some improvement at first in the distension of the abdomen, but later this was just as bad as at first. The discomfort and sometimes pain in the abdomen continued. There seemed to be a little change in the irregular fever, but it did not disappear. After prontosil was stopped cinchona and iron mixture was tried, but without success. The patient was unimproved on discharge.

Was this hookworm cachexia, cirrhosis, carcinoma of prostate with metastasis in the liver, or what? We do not know. In this case, sulfanilamide did not markedly change the ascites.

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Case 4.—B. V., Hindu, age 22. He was admitted on 15th February, 1939, and discharged on 8th May, 1939.

History.—A year and half before admission he had continuous fever for one month. There were no chills. After an interval of one month he again had fever for 20 days. He took native medicines. The fever left finally, but the feet began to swell. The swelling ascended up to the thighs but there was no swelling of the face and no diminishing of the quantity of urine.

There was a decrease in the œdema whenever he took a purgative, but it again returned. This went on for one year. Then began œdema of the face and swelling of the abdomen. For one month this had been very marked, and he was very uncomfortable.

Physical examination.—Somewhat emaciated and anæmic. Heart: loud systolic murmur over apex in 'mitral' region. Bases of lungs dull, moist râles heard. Some rhonchi over upper parts of lungs. The abdomen was much distended with fluid. Spleen and liver not enlarged. (This was corroborated even after tapping.)

Laboratory findings.—Urine: specific gravity 1.020, albumin trace; few leucocytes. Stool, hookworm ova found. Hæmoglobin 65 per cent. Kahn negative. White blood cell count 6,800. Blood pressure 116/90.

Treatment.—His abdomen was tapped and fluid removed (amount not recorded) on the first day. The next day prontosil-album was started, and was given 6 tablets a day for 5 days, then 4 a day for 9 days, then stopped for 4 days, again given 6 a day for 5 days, then discontinued for 16 days. On the 25th day (11th March, 1939), 11 pints of fluid were removed. Prontosil-album given again at 6 tablets a day for 12 days. Fifteen days after second tapping the third was done, and 10 pints removed. This was on 29th March.

At this time the patient was re-examined, and more weight placed on the heart findings. So he was digitalized, starting on 7th April, 1939, and after that a maintenance dose was given daily. We had the impression that this was doing more good than the sulfanilamide so digitalis was continued until discharge. Nevertheless, he had to be tapped, and 14 pints of fluid were removed from the abdomen on 3rd May, just 5 days before his discharge. He had been given hookworm treatment, and also iron mixture in the intervals during the prontosil therapy. He was given 2 weeks' supply of digitalis (maintenance dose of minims xv a day of the tincture) when he went home, for he lived in a village a long distance away.

Further course.—This patient returned from time to time. At first he seemed to be doing very well on the maintenance dose of digitalis but he was not too regular in taking it, and had to be tapped again twice during the next 5 or 6 months. He finally refused to take any more digitalis because it tasted bad, and he got some nausea from it. He then asked for some of the pills, since he thought that he had done better with them. In order to try the effect again he was given sulfanilamide to take, 4 tablets a day. When he next returned, however, he said that he had only taken 1 tablet a day. Since he was feeling better, had no œdema, and seemed to be improving or at least holding his own, we continued this up to the last time he came, about 1st December. At that time also he was given 16 tablets for 16 days.

Here again the question arises about habituation. Certainly the patient asked for the tablets, and had a feeling of well-being while taking them, but he had shown objective improvement also, though he was still not strong enough to work. But this later response to the drug occurred on a very small dose—0.5 gramme (7½ grains) a day—whereas the response to larger doses while he was an in-patient had not been very marked. It is quite probable that some change had been taking place in this young man not directly produced by the sulfanilamide, such as recovery from the effects of some of the native remedies which he had taken, though he did not know whether any of them had contained mercury. In any case, this late response to a small dose is very similar to what happened in the next patient. (A recent report has come that this young man died about one year after we last saw him. We have been unable to get further details.)

Case 5.—This was a Hindu male of about 40, seen only once by one of us (J. S. C.) in our branch hospital in Suriapet. We do not have a complete record of him, and he did not return for treatment but he was remarkable in that he was the first man we had seen who used sulfanilamide as a diuretic. He had been suffering for a number of months from what he described as an obstruction to the free flow of his urine, as well as from a chronic urethral discharge. He had been taking a great variety of native remedies but without result and his discomfort had been increasing so that at times he would be unable to squeeze out any urine. Then someone told him about some new pills. He tried these, and found that if he took 2 or even 1 a day he would urinate too much, but that he could keep his urine just about right by taking 1 pill every other day. When asked what the pills were he showed a bottle of sulfanilamide (B. W. & Co.).

Examination of this man showed a urethral discharge coming apparently from a chronic posterior urethritis, and also an enlarged but not especially tender prostate gland.

Though under very different circumstances from those in case 4, this man also was using sulfanilamide to increase his flow of urine. Whether in this case the drug was acting as a diuretic in the sense of increasing the secretion of urine by the kidneys we are unable to state. It cannot be assumed that he was curing the chronic infection or the enlargement of his prostate, since those were evident when we examined him, and also from the fact that if he stopped taking the pills more than 2 days, obstruction reappeared.

Case 6.—Christian male, age 35. This man was admitted first with acute gonorrhœal urethritis proved by positive smear. He had been suffering for about a week before coming for treatment. He was admitted on 5th April, 1939. Starting that afternoon, he was given 1 tablet sulfanilamide every 4 hours, and this was continued until the afternoon of the 7th, when it had to be stopped. He complained that he was urinating so much that although he was drinking water almost constantly he felt all dried up. The urethral discharge was less, but not entirely stopped. Local therapy was substituted, and he improved. But to ensure complete cure, and also to see whether he would again get the same extreme diuresis, sulfanilamide was again started on 16th April. The next day the man said there was someone sick at home and insisted on being discharged. We wondered if he were going, just to get away from this drug we were using, for he had started again with a severe diuresis and he told us later that this continued for a day or two after he went home.

A few weeks later this man returned with acute cardiac failure. We wondered whether this had any relation to the treatment we had given for his gonorrhœa. However, he improved rapidly with rest in bed, and antisyphilitic treatment. He had an initial infection, apparently several years before. Vitamin-B_1 deficiency was also probably a factor in bringing on

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the cardiac failure. We did not use sulfanilamide again in this case.

Comment.—Four cases of ascites have been presented in 2 of which there was what appeared to be a definite therapeutic response to the use of sulfanilamide in the doses ordinarily used by us in the treatment of acute and chronic infections. In case 1, a chronic infection was suspected from the history and indicated by the leucocytosis. In case 2, a chronic infection was evident in the urinary tract. In case 3, there was no response to the treatment. In that case there was no leucocytosis, and it was not definitely determined what was the cause of the ascites. In case 4, the early response to sulfanilamide in the usual doses was not marked or unquestionable, though the late response in small doses was rather remarkable. In this case there was no leucocytosis and no proof of urinary tract infection. The other 2 cases in which there was no ascites, but in which a diuretic action of sulfanilamide seemed unquestionable, have been presented with a view to attempting to understand the action of the drug in the earlier cases.

The extreme diuresis which was noted in case 6 as a very distressing complication of the treatment of gonorrhœa has not been seen by us in any other of several hundred cases treated with sulfanilamide for a variety of diseases. However, case 5, and probably also case 4 in the follow-up period, would apparently exhibit marked diuresis if the small self-determined doses were exceeded.

There are several questions arising out of this study to which we have not yet obtained satisfactory answers. Work is now in progress with respect to some of them. However, it is hoped that other workers in the pharmacological and clinical fields who have greater facilities and more clinical material will find solutions to these problems more quickly than we can.

(1) Under what conditions may sulfanilamide act as a diuretic?

(2) Is this action the result of some type of sensitization? If so, will this explain the effectiveness of a daily dose as small as 0.25 gramme (3¾ grains)?

(3) Is infection of the urinary tract, either acute or chronic, one of the necessary conditions? Or may some other type of irritation of the kidneys be necessary.

(4) What is the relationship between previous mercury medication, either in the overdoses used in the indigenous treatments or in a form such as the mercurial diuretics (salyrgan, etc.) and the appearance of this diuretic effect?

(5) Is it possible that diuresis, usually mild and therefore not particularly noticed, may be one part of the effective action of sulfanilamide in gonorrhœal urethritis?

It is commonly stated that it is unwise to give full doses of sulfanilamide in chronic nephritis,

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LIVER EXTRACT AND SULPHONAMIDES IN SMALLPOX

By N. N. CHARI, M.B. & B.S.
Bezwada

Introduction

IN this paper, I wish to present the treatment followed and the results obtained in a series of cases of smallpox, treated by me during the period 13th October, 1940 to 15th March, 1941, in the recent epidemic in Bezwada town. I do not claim any originality for the treatment. The chief interest of the investigation is that it combines the two remedial agents that have recently come to be recognized as of definite therapeutic value in this disease; namely, liver extract and the sulphonamide group of drugs.

The epidemic that occurred in this town may be described as a fairly severe one.

Routine treatment of a case of unvaccinated smallpox

Preliminary pyrexial stage.—I have been called in to see only a few cases in this stage (before the eruption has come out). A.P.C. powder was given for the severe backache, and other pains, and a simple diaphoretic mixture for the fever. I have not been able to make out 'prodromal rashes' even in one case.

Papular and vesicular stages.—This is the stage during which most of the cases came under treatment, and during this stage, adults and children above three years were given liver extract injections, and little babies and patients who were against injection therapy were put on erythgen oral liver extract, one to two teaspoonfuls thrice daily, until the pustular stage was reached. The adults receive one injection per

(*Continued from previous column*)

especially where there is a marked reduction in kidney function, for fear of retention of this substance which is usually quantitatively excreted in the urine. Likewise, it is considered somewhat dangerous to use sulfanilamide in acute nephritis where there is already a hæmorrhagic tendency, since some cases have been reported of hæmaturia following even small doses of this drug. We had one such case in a man with acute follicular tonsillitis.

(6) Is it possible that in the presence of acute or chronic inflammation of the kidneys, sulfanilamide, in an appropriate dose as yet to be determined, may be useful for the prevention or control of water-logging?

On the basis of this brief study, we do not recommend sulfanilamide as a treatment for ascites. We have had several failures, one of which was case 3. In these patients the ascites seemed to be related to a chronic disease of the liver or spleen or both. However, we do believe that our observations should lead to further investigation of the diuretic action of sulfanilamide.

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day of jectate (Upjohn) 2 c.cm. for four or five days before the pustules were formed. In one or two cases, I have used neolivacon (Union Drug Co.), 2 c.cm. ampoules, one per day.

Liver extract administration was confined to the unvaccinated cases. In only 2 or 3 of the vaccinated cases it was given because the patients were definitely anæmic.

Pustular stage.—Sulphonamide preparations were given to every case of unvaccinated and vaccinated smallpox, from the ninth or tenth day, till the sixteenth day of the illness. About 40 grains was the daily dosage for adults. Children were given doses proportionate to their ages. Also in severe cases, and in those which did not tolerate the medication by mouth, one or more ampoules of the injectable sulphonamide preparations were used. The sulphonamide preparations used are :—

May and Baker's sulphanilamide M.&B. 693 tablets and soluseptasine injections, 5 c.cm. of a 5 per cent or 10 per cent solution. Albert David's sulphonamide tablets, and sulphonamide soluble injections. Union Drug Co.'s urea sulphazide tablets and urea sulphazide injections.

The above is a brief outline of the liver extract and sulphonamide medication; I have also adopted a routine for the care of the eyes, etc., which is as follows:—

Eyes.—The eyes were daily washed with boric lotion, or magnesium sulphate solution (saturated), argyrol (20 per cent) drops were instilled, and unguentum hydrargyri oxidi flavum was smeared along the edges of the eyelids. Unguentum hydrargyri nitratis, ½ *B.P.* strength is also satisfactory for smearing the eyelids.

Ears.—In cases where the eruption affected the skin of the external auditory meatus, glycerine carbolic ear drops were used.

Nose.—In mild cases, liquid paraffin, 2 or 3 drops, was put into each nostril; in noses, badly affected, endrine drops were put, or the same was sprayed into the nostrils.

Mucous membrane of the mouth, tongue, etc.—Glycerine boric was given to the patient, to paint the mouth cavity, and the surface of the lips and tongue, twice or thrice daily. During the latter half of the pustular stage, potassium chlorate gargles (10 grains per ounce) were prescribed.

Larynx.—The larynx was affected in a majority of the unvaccinated cases as also in a few of the vaccinated cases. Steam inhalation (twice or thrice daily) with lysol or compound tincture of benzoin (20 drops of either in a pint of boiling water) was advised for these cases.

Skin.—During the papular and the vesicular stages of the disease, the skin of the body, except the skin of the scalp, was wetted with cotton-wool dipped in saturated potassium permanganate lotion, and immediately wiped dry with a soft towel. During the pustular stage, carbolic lotion, 1 in 20, was used in a similar way.

Most of my cases were from the *cheries* (poor-class dwellings) and in order to prevent the ants from victimizing the patient, his relatives were told to put the feet of the cot on small tins filled with water, so that the ants could not creep up the cot.

Genitals.—In the case of the female, the eruption on the skin of the labia and the mucous membrane of the vagina is a source of great discomfort. Washing the parts with warm boric lotion, thrice daily and painting the external skin with calamine ointment (Upjohn) gave a fair amount of relief in these cases.

Bowels.—Warm water enemata were used in the apyrexial stages of the illness, and glycerine enemata were the routine in the pyrexial stage.

Sleep.—This was ensured by giving a chloral and bromide draught during the papular and vesicular stages of the disease. In the pustular stage of cases treated by the routine in the earlier stages, there was practically no need to give medicines for sleep.

Diet.—During the pyrexial stage we have restricted the patient's diet to fluids only—barley water, glucose water, cow's milk, weak coffee or tea, ovaltine, milo, malted milk, arrowroot conjee, etc. During the apyrexial period, the patient was allowed to take a light rice diet, with vegetable curry, pepper water and fresh buttermilk. After the sixteenth day of the illness, or earlier if there was no pyrexia, the patient was allowed gradually to increase his diet.

Routine treatment of a vaccinated smallpox case

The treatment of a case of smallpox in a vaccinated person differed from that of an unvaccinated person, in that no liver extract was given in any form to the former. Sulphonamide in the dosage indicated was the main factor in the treatment, and was given between the ninth and the sixteenth days. The routine treatment of the eyes, nose, etc., was however followed throughout the illness. It is my considered opinion that liver extract need not be given to cases of smallpox in the successfully vaccinated, provided not more than 25 years have elapsed since the successful vaccination.

Complications, their prevention and treatment

Hyperpyrexia.—This was conspicuous by its absence in my series of cases. This is probably due to the liver extract and sulphonamide medication. It is also to be stated here that cryogenine (Lumiere) in 1 to 5 grains dosage (according to age) was given to the patient's attendant, to be given by mouth to the patient if the temperature went up to more than 103°F.

Myocardial failure.—In cases of suspected myocardial weakness, glucose and brandy (1 to 2 fluid drams per 1 ounce of glucose water) were given every 4 or 6 hours. In cases evidenced by definite weakening of the first sound of the heart

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and a weak pulse, coramine, camphor in ether, etc., have been used.

Respiratory distress.—This is caused by the physical obstruction to the air passages, whose mucous membrane is covered by the eruption. Also the vocal cords in the larynx are subject to inflammatory changes similar to the peripheral eruption, and are able to obstruct more effectively. There is an increased formation of mucus, adding to the trouble, and producing a rattling noise in the throat during respiration. By giving steam inhalation, with lysol or tincture of benzoin, loosening of the mucus and its expulsion were considerably helped. In cases where the obstruction was considerable, and likely to tell on the muscles of respiration, I have used injections of strychnine sulph. 1/100 to 1/60 of a grain, to stimulate the muscles to perform their task more efficiently.

Anuria and nephritis.—Many of the severe confluent cases suffered from anuria for 24 hours or more, owing probably to the intense toxæmia. Potassium citrate, 20 to 30 grains per dose (or according to age in children), given once every 2 or 3 hours for two or three doses, produced urination in almost every case. True nephritis with swelling of the face and albumin in the urine was met with only in one case, and the sulphonamide which this patient was getting at this time was stopped and she was put on barley water and on alkaline diuretic mixture. The next day the swelling subsided and the albumin in the urine was much less. This is more likely to have been a case of nephritis due to the sulphonamide, than due to the acute infectious disease.

Joint troubles.—Many of the cases in which the joint complications occurred were those that had not received any sulphonamide at all, or those that did not get a sufficient dose of it, for one reason or another. The commonest manifestation was synovitis with effusion; the joint most affected was the elbow. It was in every case relieved by thermoplast (Andhra Pharmaceutical) dressings, and sulphonamide administration. Glycerine icthyol dressings also helped in a few cases, but these were applied only after the sulphonamide was stopped.

Asthma and smallpox.—There were two cases of asthmatics, attacked by smallpox. Both were unvaccinated; and the disease was in each case of the most virulent type. These also suffered from greater respiratory distress than a severe unvaccinated case, similarly affected. Both of them died, and I have, after the experience, come to doubt the wisdom of liver extract administration in the asthmatic cases.

Menses and menstrual troubles.—I have seen a few cases in which patients happened to get their monthly periods during the acute stage of smallpox. The bleeding was more than usual in cases in which it used to be normal in amount during health. In cases, with a history of menorrhagia, it was more profuse than ever, and one of my cases was lost due to the excessive bleeding alone.

Pregnancy and smallpox.—One of the unvaccinated cases was in the seventh month of pregnancy at the time of the onset of the attack, and was having a temperature of 105°F., on the occasion of my first visit, which was a few hours after the eruption was noticed. She had two abortions before this pregnancy. She was given the routine treatment with jectate injections and M.&B. 693 tablets, and she recovered nicely. This was a confluent type of case; still there was really no occasion on which fear was felt for the sake of the fœtus. The mother had swelling around the ankles on the fourteenth day of illness; she was put on glucose and brandy every six hours and she rallied very well. I saw the baby on the third day of its birth, and there was no evidence of the disease on her. But, though born full-term, she was a puny little thing and had big fontanelles, at least twice the size of those of a normal child at birth. Her eyes were apparently unaffected.

RESULTS

Total number of cases treated during the acute stage of the disease (vaccinated and unvaccinated)	68
Total number of deaths	11
Percentage mortality	16.17
Total number of unvaccinated cases ..	41
Number of deaths in above	10
Percentage mortality	24.4
Total number of vaccinated cases ..	27
Total number of deaths in above ..	1
Percentage mortality	3.7

This case of death from the vaccinated series did not show any vaccination marks; probably the vaccination was unsuccessful. He had a septic wound on his left foot which had been bleeding, unattended to for the previous ten days, and he died within ten hours of commencing treatment.

Except for this case, there was no fatality in the vaccinated cases.

Total number of unvaccinated cases treated with liver extract injections and sulphonamides	21
Number of deaths in above	5
Percentage mortality	23.8
Total number of cases (babies and children) treated with oral liver extract and sulphonamides	8
Number of deaths from above ..	3
Percentage mortality	37.5

Rôle of liver extract in smallpox

1. Liver extract does not abort the disease or do away with the pustular stage of the disease altogether.
2. The toxicity of the acute stage of the disease is definitely lessened by liver extract which minimizes the mortality as well.
3. In the fulminating types, where the eruption fails to develop into the vesicular stage, after two or three liver extract injections, the eruption comes out nicely, with diminution of the general toxic symptoms, like delirium. That is, it tends to make the disease take a more normal course.

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4. Hæmorrhages into the vesicles have not been seen in this series of cases. This is probably due to liver extract. In a few cases of persistent small hæmorrhages from mucous membranes, liver extract injections have proved useful in stopping these.
5. Because the patient's resistance is increased by the liver extract administration, he suffers less damage to his vitality, and hence the convalescent period is lessened.
6. In all the cases treated with sulphonamides, and especially those that received liver extract as well, disfigurement due to pitting is certainly less than an untreated case of smallpox of equal severity. But I am inclined to give the credit for this to the sulphonamides, which by lessening the amount of the inflammation in and around the vesicles reduce the ultimate damage to the skin and minimize the disfigurement.
7. I do not think that liver extract is a necessary (for the saving of life) medication in cases of smallpox in the successfully vaccinated. Of course the patient stands to gain by getting it. But in an epidemic, it is probably cheaper to confine liver extract administration to the unvaccinated cases only. I have had no occasion to regret my not having given liver extract to the successfully vaccinated cases.
8. Liver extract orally administered, is far less efficacious in this disease than injectable liver extracts, probably because the latter act more quickly.

Rôle of sulphonamides in smallpox

1. Sulphonamide does not abort the disease, or do away with the pustular stage even if given earlier.
2. Sulphonamide is certainly a necessary and valuable drug in the pustular stage of the disease, both for lessening the evil effects of sepsis in the acute stage and for preventing the incidence of late septic manifestations such as boils, abscesses and joint troubles.
3. Sulphonamide definitely tends to lessen the mortality of the disease.
4. By reducing the inflammation, it lessens the damage to the skin, and consequently minimizes the disfigurement.
5. In cases where the mucous membrane of the upper respiratory passages is affected, M.&B. 693 seems to be the drug of choice, for administration during the pustular stage, in the place of ordinary sulphanilamide, probably because of its specific effect against the pneumococcus, which is a normal inhabitant of the mouth, etc. In some persons whether this explanation is correct or not, there is no denying the fact that M.&B. 693 is a more efficacious drug to use than the ordinary sulphanilamide in the pustular stage of smallpox.

All the liver extract injections, Upjohn's jectate, and Union Drug Co.'s neolivacon, were freely given to the Smallpox Free Dispensary (of which I was the honorary medical officer) by Messrs. T. M. Thakore and Co. of Bombay and Messrs. Union Drug Co. of Calcutta, respectively. Erythgen oral liver extract was given to us by Messrs. Muller and Phipps, Bombay.

Almost all the sulphonamide used was freely given to the dispensary by:

Messrs. Albert David Ltd. of Calcutta.

Messrs. Union Drug Co. of Calcutta.

Messrs. May and Baker (India), Ltd., Calcutta.

I wish to thank them all heartily for their generous help.

A Mirror of Hospital Practice

INTRAPARTUM UTERINE RUPTURE

By GERALD H. COORAY, M.B., B.S. (Lond.), M.R.C.S., D.T.M. & H. (Eng.).

Surgical Registrar, General Hospital, Colombo, Ceylon

THE interesting article of Professor H. S. Waters, on the above subject, which appeared in the *Indian Medical Gazette* of September 1941, prompts me to record the following case of rupture of the uterus during labour:—

Clinical history (obtained from deceased's brother).—Primipara, aged 30 years, was living in a small hut in a remote village with her younger brother, a lad of about 14 years. There were no other inmates in the house. At night she got labour pains and went inside the only room of her hut and bolted the door. Her brother, who was in the verandah, heard her groaning for some time, but not paying any attention to this, he fell asleep. He awoke in the morning and called his sister. Getting no answer he forced the door open and found her dead.

A post-mortem examination was performed by me on the same day, about 12 hours after death.

The body was that of a well-nourished woman. The peritoneal cavity contained about 2 pints of blood. The uterus was enlarged to the size of a full-term pregnancy. On its left side, lying free in the abdomen, was a full-term male fœtus with an enormous head due to hydrocephalus. On the left lateral wall of the uterus, commencing at the junction of the upper and lower uterine segment, there was a complete rupture of the muscle about 6 inches long, through which the fœtus had escaped into the abdominal cavity. The placenta had separated and was lying free in the uterine cavity, which contained blood.

There was no pelvic contraction, but the fœtal head was considerably enlarged resulting in marked disproportion. The enlargement of the head was due to an extreme degree of hydrocephalus and on evacuation of the fluid two rounded masses about the size of a lime were seen. These represented the cerebral hemispheres.

Comment

The cause of the rupture in this case was not the same as in Professor Waters' four cases. In

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two, the rupture is stated to have been probably caused by manipulation and in one it was due to degenerative changes in the uterine wall. In the fourth no obvious cause was found. In this case there is no doubt that the rupture was brought about by obstructed labour due to a marked disproportion between the child's head and the pelvic inlet. This would have been detected, if the unfortunate woman had attended an antenatal clinic. If medical aid was available during labour the catastrophe of rupture would have been avoided by perforation of the head. Unfortunately, labour took place many miles from medical aid, not an uncommon occurrence in India.

INTUSSUSCEPTION CAUSED BY AMŒBIC DYSENTERY

By A. K. MAKFUZAL HOQUE

Resident Medical Officer, Surgical Ward, Mitford Hospital, Dacca

THE following case is worthy of record as it must be rare to find a chronic intussusception due to dysenteric thickening and ulceration of the cæcum :—

Case history.—S., aged 12 years, a Muslim male, was admitted into the Mitford Hospital, Dacca, on 16th August, 1941, complaining of abdominal pain and diarrhœa with blood and mucus.

Examination.—A thin, lightly-built boy. He had a movable tumour in the epigastrium. The abdomen was soft and there was no tenderness. His relatives stated that he had had an acute attack of dysentery one month previously and the lump appeared in the abdomen at that time. There was no history of vomiting or other signs of obstruction. The lump persisted and the dysentery, though somewhat improved, still continued.

Stools showed *Entamœba histolytica,* both vegetative and cysts, in very large numbers. A diagnosis of chronic intussusception due to amœbic thickening was made and the patient was started on a course of emetine and low-pressure carbarsone bowel washes. Instructions were given to keep the patient under strict observation and to report any rise in pulse rate or any signs of obstruction. After seven days the patient's general condition was better and the stools were free from *E. histolytica* but still contained some mucus. Intussusception was confirmed by a barium enema and operation was decided upon.

Operation note.—Under general anæsthesia the abdomen was opened by a right paramedian incision, about three inches long, with its centre opposite the umbilicus. The apex of the intussusception was found at the splenic flexure and the reduction was easy because no adhesions had formed between the layers of the intussusception. When reduction was complete the cæcum was easily drawn from the wound and was found to have a very long mesentery, at least seven inches in depth. When the cæcum was inspected it was found that even the small amount of pressure required to reduce the intussusception had caused a perforation of an ulcer at the base of the appendix. The appendix was removed and the stump, along with the perforation, was invaginated by a few Lembert's sutures. The thickened and friable condition of the cæcal wall prevented the use of the usual purse-string suture. The abdomen was closed in layers and a drain left in the cæcal region, through a separate stab wound.

Post-operative progress.—As the patient had some chronic bronchitis and as there had been some contamination from the cæcal perforation he was given M.&B. 693, two tablets hourly, but in spite of this pneumonia developed on the second day. M.&B. 693 was continued for three days and the patient gradually improved. The drainage tube was removed on the third morning and the stitches on the seventh morning. A course of carbarsone was given by mouth and he left the hospital quite well on the twentieth day after operation.

My thanks are due to Major Fisher, I.M.S., Superintendent of the Mitford Hospital, Dacca, under whom the patient was admitted and who performed the operation, for permission to report this case.

X-ray note by R. M. Roy Chowdhury
Opaque enema examination

The opaque fluid reaching the recto-pelvic junction ceased to flow onward for a considerable time. Afterwards it was noted to climb up the sigmoid and the left colon and, reaching the splenic flexure, it was again seen to be arrested. Pain and discomfort were complained of.

On palpation the whole of the transverse colon was definitely tender and firmly rigid and it was seen like a balloon. Saccules of the ascending and right half of the transverse colon were seen to be most unusually close to one another, so much so that the plica semilunaris coli appeared as thickly set concentric rings resembling a cushion spring.

Modified Trendelenberg's position was made and on elevating the buttocks, the fluid was seen to flow onward and in a very thin layer through the ballooned gut, surrounding an axis made of a thin stream of barium for a small distance in the right half of the transverse colon; it appeared to be composed of two tubes, the inner being very narrow and tubular and the outer one a hollow cylinder covered with a thin layer of the opaque fluid. The gut proximal to it was enormously dilated.

After another half hour no further onward flow could be noted except that a very thin layer of the fluid was seen to pass most reluctantly through the jacket tube and this made the rings, noted before, more prominent. The right iliac fossa and the right lumbar region appeared to be empty and no resistance could be felt.

Skiagrams taken in two different planes corroborate the finding stated above.

Conclusion.—The evidence is that of intussusception. The thin stream of barium is in the intussusception and the cylinder of barium lies between the intussusception and the intussuscepiens.

A CASE OF POST ECLAMPSIA

By SURENDRA MOHAN ROY, L.M.P.

The Barada Pharmacy, Pukurpar, Pabna

History.—A girl aged 15—primigravida—full term pregnancy, œdema all over the body especially the feet, delivered of a healthy child on 2nd October, 1941, at 10 p.m. Four hours after delivery the patient complained of intense headache and soon eclamptic fits started. I attended the patient and observed the following conditions—temperature 103°F., pulse 130, comatose, eyes and face congested, fits every 15 to 20 minutes, laboured and stertorous breathing, twitching of the muscles of the face and extremities, tossing of the hands and fixation of the eye.

Treatment.—Stronganoff's treatment was immediately started and 25 c.cm. of 25 per cent glucose was injected intravenously, 15 c.cm. of 25 per cent magnesium sulphate was given intramuscularly and 2 c.cm. iodine solution was given intravenously. A mixture containing 30 grains of chloral hydrate, 2 drachms of infusum digitalis and 4 ounces of normal saline was given slowly *per rectum.* After this treatment she had 3 fits in 3 hours. About 4 ounces of blood was let out by venesection. After venesection the picture of the patient completely changed. She became quieter, breathed easily, the rhonchi of the lung disappeared—blood pressure fell, improved diuresis, diminished œdema. The patient became fully conscious after 12 hours.

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GANGRENOUS STOMATITIS TREATED WITH M&B 693

By D. N. DEB SARMA

Medical Officer, Duliabam Tea Estate, Khowang, Assam

ON the 3rd September, 1941, a poorly-nourished coolie woman aged about 35 years came to hospital for treatment for swelling and pain in her right cheek, and fever. She had been suffering from a bad tooth of the affected side for four days previously, felt pain and swelling in her cheek on the previous night, and fever came only in the morning.

I found the following:—

1. Decay of the lower second molar tooth.
2. A scratch on the mucous membrane opposite the carious tooth.
3. A painful swelling of both the gum and the cheek with much induration of the latter.
4. Other signs and symptoms of inflammation, *e.g.*, redness and tenderness on the external surface of the cheek, fever (102°F.).

The salivary glands also were inflamed.

Examination of other systems revealed no abnormality. No history of malaria or any other previous illness was obtained. The clinical signs and symptoms suggested the condition to be a case of simple inflammation. Consequently a solution of potassium permanganate (1 in 1,000) for gargle, a magnesium sulphate-glycerine paste for application on the cheek and a mixture of quinine, iron and nux vomica and magnesium sulphate for oral administration, three times daily, were given. No improvement was seen the next morning except a fall of temperature from 102° to 100°F. A marked aggravation of all other symptoms was noticed instead of any improvement. An offensive sloughing punched-out ulcer inside the cheek and a glazed, dusky red, indurated spot on the external surface of the cheek were observed. The case was finally diagnosed as cancrum oris and the patient was immediately given three tablets (0.5 gm. × 3) of M.&B. 693, dissolved in water, and then she was given two tablets four hourly for 24 hours. Thus she took only 15 tablets, and this controlled the infection. The patient was then given stimulants, milk diet and iron and quinine mixture for a few days. Washing and dressing were continued throughout the period. There was, however, a small perforation in the cheek and I had to remove the slough and evacuate the retained discharges by incision inside the cheek. The ulcers healed up completely within a fortnight.

Another case of noma (coolie, male, 28 years) was treated with Seroid, a preparation of sulphanilamide, manufactured by the Standard Pharmaceutical Works. High temperature, marked toxæmia and sloughing of the ulcer were the chief symptoms when I saw the case first. An injection of Seroid 5 c.cm. was at once given intramuscularly. Then he was given Seroid tablets for two days, 2 tablets for a dose and at an interval of 6 hours. This controlled the infection but the patient died of pneumonia in the fourth week after his admission.

Points of interest:

1. A very small quantity of sulphonamide was required in both the cases.
2. Absence of constitutional symptoms in the first case.
3. In the first case fall of temperature in spite of a marked progress of the infection.
4. In the second case it is interesting to note that the patient was attacked by pneumonia after his oral sepsis was cured.

TOXIC EFFECT OF SULPHAPYRIDINE ON THE LIVER: A CASE REPORT

By MAN SINGH

MAJOR, I.M.S.

D. A. D. P., Lucknow District, Ranikhet, and Officer in-charge, District Laboratory, Ranikhet

History.—An infant aged 4 months was brought to hospital in a moribund state and died within half an hour. On questioning, the mother said that the infant became ill on the previous day with a mild temperature and she took the child to a private practitioner who prescribed a cough mixture and ¼ tablet of sulphapyridine every 3 hours. The child did not respond to this treatment and became worse. The mother became alarmed and brought her to hospital. The mother was extremely vague about the dosage and the time it was started. Four grammes or possibly more of the drug were given in 36 hours.

The child was pulseless on admission with cold blue hands, blue lips and ears; no rash, and a temperature of 102°F. was noted before death. On account of lack of knowledge of the child's recent history, autopsy was considered necessary.

Pathological report.—Lung, cerebrum, cerebellum, spleen, pancreas and kidney—normal in appearance.

Liver.—Hepatic cells show cloudy swelling and a certain amount of degenerative changes amounting to necrosis.

Comment.—As practically all the organs, especially in a child of that age, were found normal the cause of degeneration and necrosis of the liver cells was first thought to be specific. Further sections were cut and stained with selective stain (Levaditi's) and syphilis was excluded.

The toxic effects of sulphanilamide on the liver are known. Davis, Harris and Schmeisser (1940) experimenting with rats have shown irregularly-placed focal areas of necrosis of the liver cells on various occasions when large doses were injected, but as far as I am aware only 2 fatal cases from sulphanilamide poisoning have been reported in English so far. One was by Cline (1938) of acute yellow atrophy and the other toxic hepatitis (subacute yellow atrophy) reported by Berger and Applebaum (1941).

With increasing use of this drug more cases of hepatitis are to be expected. Whether this injury is due to toxicity or hypersensitivity, it is difficult to say though I am inclined to think the latter because if it were toxicity one would come across many more cases in hospitals.

I wish to thank the Officer Commanding B.M.H., Allahabad, for his permission to report this case.

REFERENCES

BERGER, S. S., and APPLEBAUM, H. S. (1941). *J. Lab. and Clin. Med.*, **26**, 785.

CLINE, E. W. (1938) .. *J. Amer. Med. Assoc.*, **111**, 2384.

DAVIS, H. A., HARRIS, L. C., and SCHMEISSER, H. C. (1940). *J. Lab. and Clin. Med.*, **25**, 1263.

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Indian Medical Gazette

FEBRUARY

INFANTILE BERI-BERI

IN all Eastern countries in which beri-beri is prevalent, the disease is known to be common in infants. According to figures reported by Burnet and Aykroyd (1935)*, about one-third of the deaths from beri-beri in Japan during the years 1928–32 were in infants under one year, while in Manila in the Philippines during the same period the infantile deaths constituted about half the total deaths from beri-beri. In India, adult beri-beri is a common disease in the Northern Circars district of the Madras Presidency, but beri-beri in infants has not hitherto been observed and described. Experience in other countries suggests that it is likely to be a common condition in the beri-beri area.

Two recent papers throw light on this question. Rao (1941)† reports five cases of a condition locally known as 'anasa' which were admitted to the King George Hospital in Vizagapatam. All these were breast-fed infants; three were aged 3 months, one 4 months, and one 2½ years. Signs included screaming, restlessness, cyanosis, dyspnœa, feeble and husky voice, and vomiting. In most cases the mother showed evidence of beri-beri or peripheral neuritis. Treatment of the infant by pure vitamin B_1 (1 to 5 mg. daily) had an immediate effect, leading in most cases to disappearance of signs within 24 to 48 months. It is not stated whether the vitamin was administered orally or parenterally.

Aykroyd and Krishnan (1941)‡, having observed cases of infantile beri-beri clinically, approached the problem by the study of provincial and municipal records of infantile mortality at various periods of infancy. It is known that beri-beri is most common in breast-fed infants at about the third and fourth months of life. The annual reports of the Director of Public Health, Madras, provide data about infantile mortality in municipalities in the Madras Presidency, deaths being grouped under the periods 0 to 1 month, 1 to 6 months and 6 months to 1 year. A comparison was drawn between the proportionate mortality in these periods in 17 towns in the Northern Circars and 17 towns south of Madras City outside the beri-beri area in 1938, the total population concerned being approximately the same in each case. It was found that in the beri-beri area a greater proportion of infant mortality occurred in the period 1 to 6 months than in the periods 0 to 1 month and 6 to 12 months. In the other towns and in British India generally, the greatest proportionate mortality occurred during the first month of life.

A detailed study of the available records of infant mortality in the age group 0 to 6 months, at each month of life, was made in 6 municipalities, 3 in the beri-beri area and 3 elsewhere in the province. The period covered was the years 1935–39. In the towns in the beri-beri area there was a sharp and constant peak in mortality at the fourth month of life, not visible in the records of other towns. The authors remark that while the inaccuracy of vital statistics in India is generally recognized, they 'can think of no reason why more deaths should be consistently recorded as occurring in the fourth than in other months, except the obvious one that more deaths actually occurred in the fourth month'.

They point out that their observations, though suggestive, do not *prove* that beri-beri is an important cause of infantile mortality in the Northern Circars. Proof can be obtained only by field observations and investigations in which the cause of infant deaths is carefully investigated and trial is made of the effect of vitamin B_1 on sick infants. Medical practitioners and health officers in the beri-beri area should be on the look-out for infantile beri-beri in its various manifestations. While acute fulminating beri-beri may be rare in infants outside the beri-beri area, it is possible that minor degrees of vitamin-B_1 deficiency may be an important cause of 'failure to thrive' and ill-health among infants.

Aykroyd and Krishnan give the following clinical description which they say is based on textbook accounts and their own observations:—

'Beri-beri usually occurs in breast-fed infants aged 3 to 4 months. Often the child fails to gain in weight during a week or so previous to the attack. In the acute form the infant is suddenly seized with what appear to be severe paroxysms of pain; during a paroxysm it may straighten out its body and become quite rigid. Between attacks, the muscles feel abnormally soft and flabby. Vomiting is frequent. There is usually cyanosis and coldness of the extremities and difficulty in breathing is obvious. Right-sided dilatation of the heart is common and the pulse is weak and rapid. Excretion of urine is diminished. General œdema is rare but localized œdema may be observed. A husky or almost inaudible voice, due to œdema of the larynx and not to paralysis of the vocal cords, is very characteristic of infantile beri-beri. The knee-jerks may be absent. Death often occurs within 24 hours unless the appropriate treatment is given.

In more chronic cases the usual clinical picture is that of a pale, flabby baby, not gaining in weight and becoming weaker and weaker. Vomiting and constipation are frequent. Infants with chronic beri-beri may die suddenly of heart failure.

Examination of the mother will often reveal evidence of beri-beri in the form of slight paresis, difficulty in walking, and numbness and tingling in the extremities. She will often describe the sudden death of previous infants at the age of 3 to 4 months or thereabouts.

The therapeutic test is the most satisfactory method of diagnosis. Injection of pure synthetic vitamin B_1

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* BURNET, ET., and AYKROYD, W. R. (1935). *Quart. Bull. Health Organization, League of Nations*, **4**, 323.

† RAO, C. K. P. (1941) .. *Indian J. Pediat.*, **8**, 241.

‡ AYKROYD, W. R., and KRISHNAN, B. G. (1941). *Indian J. Med. Res.*, **29**, 703.

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may relieve an infant which appears to be almost moribund. In very acute cases less concentrated preparations, such as yeast or extract of rice polishings, may not have time to act, but they may be effective when the condition is less grave—witness the success achieved in the Philippines in the treatment of infantile beri-beri with "tiki-tiki", an alcoholic extract of rice polishings.'

Finally the following passage from a letter written by a hospital physician in a town in the Northern Circars in December 1941 is interesting and instructive:—

'Although many patients present symptoms suggestive of vitamin-B, deficiency, we have seen very few cases of severe beri-beri this year. If this applied only to patients who come regularly to the hospital for treatment or ante-natal care, we might ascribe it to success in our efforts to educate the people; but it applies also to outlying villages, for very few beri-beri patients have been brought from them. It would seem that the high price of milled rice has made many people eat other grain at least for one meal. Neither have we had any cases of acute, *i.e.*, fulminant, beri-beri in infants this year, though mothers still report cases where an apparently healthy baby has begun to scream and died before the child could be taken to hospital. We have, however, had many cases of ill-nourished babies whose condition appeared hopeless, and yet rapid recovery followed after vitamin B, was given by injection. We are now giving bigger dosage, 25 mg. to adults with marked dyspnœa, and 5 to 10 mg. doses to infants.'

A.

PLAGIARISM

WE regret that we must admit to having been unconscious accomplices in an act of flagrant plagiarism.

In a recent number we published a paper on a certain modern surgical procedure. We accepted and published this article in good faith believing that it was an original description of this particular technique. We did not imagine that all the ideas were original; in fact we naturally expected that the authors would have taken full advantage of all the recent literature on the subject and have added practical points from their own experience under local conditions, but we certainly did not suspect that more than three-quarters of the article was a word for word, sentence for sentence, and paragraph for paragraph a copy of a paper that had appeared in an English contemporary only a little over a year earlier.

We remonstrated with the perpetrators of this blatant plagiarism. The excuse given by the junior writer was that the substance of the paper had been given to him as a guide to procedure, by his late chief in a medical college hospital where he had been a house surgeon, and that he did not know that it was copied from a published paper. If this statement is true, it only seems to us to deepen the hue of the crime, for the writers gave no indication in the paper that they were reproducing word for word another surgeon's instructions and there was no acknowledgment of any kind. The senior 'writer' appears to have had nothing to do with writing the paper, beyond 'correcting' the typescript and disclaims all knowledge of the source. This habit of claiming joint authorship without any justification is unfortunately not an uncommon one in this country. One great danger of such a procedure is here exemplified.

We are not proud of our share in this unfortunate incident, particularly as the medical journal in which the paper appeared is on our exchange list, but it is humanly impossible for us to be familiar with all the tens of thousands of medical articles that are published annually. We owe our sincere apologies to the journal and author in question, and these apologies have been issued, though we have not yet received any complaint from these sources.

Special Articles

THE ANTI-PELLAGRA FACTOR*

By K. V. GIRI, D.SC., A.I.I.SC., F.A.SC.
(*From the Biochemical Laboratory, Andhra University, Waltair*)

THE pellagra-preventive factor belongs to the important group of B-vitamins. The discovery of this vitamin and its therapeutic value in pellagra are of very recent date. Dr. Joseph Goldberger, a surgeon in the United States Public Health Service was the pioneer in the discovery of the cause and cure of pellagra. In 1926, it was first shown by Goldberger and co-workers (1926) that the water-soluble B was a complex composed of at least two dietary essentials—one, which is necessary for growth and prevention of polyneuritis and unstable to heat, and the other also necessary for growth and for the prevention of a pellagra-like dermatitis in rats, which is relatively stable to heat. These two factors came to be known as anti-neuritic vitamin and the anti-pellagra factor and also as vitamins B_1 and B_2, respectively. Goldberger considered that the anti-pellagra factor was identical with a vitamin which prevented pellagra in human beings. This factor was later on called vitamin G. The same factor was thought to be identical with a factor which prevented black tongue in dogs and rabbits (Goldberger *et al.*, 1928).

Thus 'vitamin B_2' was found to possess the following properties;—

*Andhra University Extension Lecture, delivered at the Andhra Medical College, Vizagapatam, on 17th January, 1941.

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1. It was essential for rats as a supplement to vitamin B_1 for normal growth.

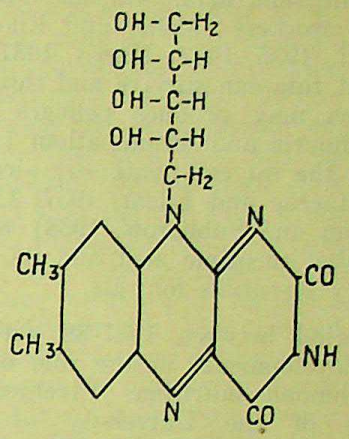
2. It protected against rat pellagra, originally described by Goldberger and Lillie (1926) and also called 'rat acrodynia' by György *et al.* (1937). It is characterized by florid dermatitis, roughly symmetrical with swelling and redness of the digits of the paws and ears.

3. It protected against black tongue in dogs.

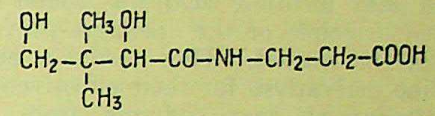
4. It cured pellagra in human beings.

Later investigations showed that the pellagra-like dermatitis in rats was difficult to produce, and the vitamin G content of foods was therefore, determined biologically by its stimulating effect on growth. It was, however, soon revealed (Aykroyd, 1930) that vitamin G or B_2 as it was named by English authors was present in foodstuffs which are constituents of typical pellagra-producing diets. It, therefore, became clear that the vitamin is composite. The first step towards the characterization of the complex was the recognition that lactoflavin had growth-promoting activity for rats (György *et al.*, 1933). Later it was proved that the growth-promoting effect of the vitamin B_2 complex was due to lactoflavin, and it was shown to be different from the 'rat pellagra' factor, which was subsequently named 'vitamin B_6' (György, 1935; Harris, 1935; Chick *et al.*, 1935) which has since been separated in the pure crystalline state (Lepkovsky, 1938; György, 1938; Kuhn and Wendt, 1938; Keresztesy and Stevens, 1938).

Lastly, it has been shown (Birch *et al.*, 1935) that the factor which protects against human pellagra (P-P factor) is another component of the vitamin B_2 complex. Thus it was only in the year 1935, that it was recognized that 'vitamin B_2' is a complex containing several vitamins. Since then the family of B-vitamins has grown enormously, and we have at present not less than ten vitamins in the family. The exact number of vitamins present in the vitamin B complex, which are essential for human beings, is still undetermined. There are, however, four vitamins about which sufficient evidence exists to warrant discussion in connexion with the treatment and prevention of pellagra. These are riboflavin or vitamin B_2 (G); the rat anti-dermatitis factor or vitamin B_6, the filtrate factor or chick pellagra factor, and pellagra-preventive vitamin or black tongue preventive factor. All these four factors of vitamin B_2 complex have now been identified with pure chemical substances. The chemical constitution of all these factors is known. Vitamin B_6 is being synthesized chemically (Harris and Folkers, 1939). It is 2-methyl-3-hydroxy-4-5-dihydroxymethyl pyridine. The chick anti-dermatitis factor has been identified with pantothenic acid, which is (+) $\alpha.\gamma$-dihydroxy-β-β-dimethyl-butyryl-β'-alanide (Stiller *et al.*, 1940). Lastly the pellagra-preventive factor is identified with nicotinic acid or its amide. The structural formulæ of these four factors are shown below:—

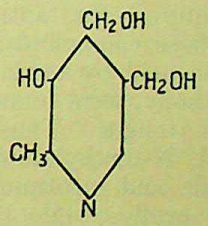


Lactoflavin (vitamin B_2).

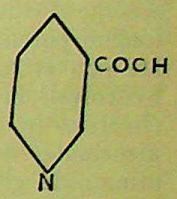


Pantothenic acid

[(+) $\alpha.\gamma$-dihydroxy-β-β-dimethyl-butyryl-β'-alanide.]



Vitamin B_6 (2-methyl-3-hydroxy-4-5-dihydroxymethyl substituted pyridine).



Nicotinic acid.

Chemical identification of the P-P factor with nicotinic acid.—As in the case of other vitamins, the discovery of the vitamin nature of nicotinic acid has been rendered possible only by the intense studies conducted with purified substances on small laboratory animals. Nicotinic acid was first isolated by Funk in 1913 from rice polishings, and he believed the substance which cures polyneuritis to be a combination of nicotinic acid with a pyrimidine base. After the work of Funk there was no important advance made in the possible rôle of nicotinic acid in living systems until the work of Warberg and Christian (1935) who found that the hydrolysis products from the coenzyme which he had isolated from red corpuscles of horse blood, contained nicotinic acid amide. Later, the importance of nicotinamide in the field of nutrition was recognized by Euler and Malmberg (1936) who found that although the addition of nicotinic acid or nicotinamide to a ration very similar to the Sherman-Bourquin diet supplemented with a vitamin B_1 and flavin did not affect the growth in rats, those receiving the nicotinic acid were found to live longer than the controls. Frost and Elvehjem (1937)

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obtained a definite growth response in rats fed on rations supplemented with adenine nucleotide and nicotinic acid. On the other hand a number of workers (Miller and Rhoads, 1935; Birch *et al.*, 1935, 1937; Harris, 1937) have reported that rats can survive and thrive well on diets which may produce pellagra in human beings. Shourie and Swaminathan (1940) conclude that the rat can synthesize nicotinic acid. Others (Macrae and Edgar, 1937; Cook *et al.*, 1937; Dann and Subbarow, 1938) were unable to show that nicotinic acid and its derivatives are dietary essentials for rats.

The period between 1937-38 witnessed important developments in the rôle of nicotinic acid in human nutrition. Elvehjem and his associates of the University of Wisconsin (Elvehjem *et al.*, 1937; Woolley *et al.*, 1938) found that liver extract cured black tongue in dogs and that nicotinic acid was found to be the active principle or the 'pellagra-preventive factor' in the extract. They tested a number of pyridine derivatives for their effectiveness in the treatment of dogs suffering from black tongue, a condition which has for a number of years been considered analogous to human pellagra. The results indicate that a highly specific structure is required for anti-black-tongue potency. Only those compounds, which are converted to nicotinic acid by oxidation or hydrolysis in the animal body, were found to be effective in curing black tongue. Thus ethyl nicotinate, nicotinic acid, N-diethylamide, nicotinamide glucoside iodide and nicotinuric acid were active when given orally, while trigonelline, nicotinamide methochloride, pyridine, pyridine-β-sulfonic acid, 6-methyl nicotinic acid, -acetyl pyridine, quinolinic acid, picolinic acid, iso-nicotinic acid, nipecotic acid, and nicotinonitrile were inactive at levels three to four times higher than the curative level of nicotinic acid. The α and γ isomers of nicotinic acid (picolinic acid and iso-nicotinic acid) were also found to be inactive. Thus it is clear that all those compounds in which one of the ring hydrogens had been substituted by a methyl or carboxyl group, or in which a methyl group had been added to the ring nitrogen, were inactive. As soon as the efficacy of nicotinic acid in the treatment of black tongue in dogs was established, nicotinic acid has been used in the treatment of pellagra in human beings and has been found to be very efficient. During the past three years nicotinic acid has been used in treating hundreds of cases of pellagra and dramatic results are reported within 24 hours after its administration (Smith *et al.*, 1937; Fouts *et al.*, 1937; Spies, Cooper and Blankenhorn, 1938). It is now firmly established that nicotinic acid is a vitamin which is an essential dietary constituent for human beings. Monkeys and dogs resemble human beings in requiring the provision of nicotinic acid, while rats are relatively insensitive to shortage of this vitamin.

The prevention and treatment of pellagra in human beings.—The disease pellagra is the condition in man which is associated with nicotinic acid deficiency. The term 'pellagra' means 'rough skin', which is the outstanding symptom of the disease. It is a non-contagious disease, occurring at any age in either sex. It is more common in the poorer classes. The principal symptoms of the disease arise from the skin, the gastro-intestinal tract and the nervous system. In very advanced stages of the disease the classical 'three D's'—dermatitis, diarrhœa and dementia—are present. Such classical cases of pellagra are very uncommon, and all these symptoms may not occur together.

The skin.—Typical skin lesions are very characteristic of pellagra. The lesions may appear on any part of the skin. In general, however, the skin of the back of the hands, the elbows, the face, the neck, the knees and the feet, are mostly affected. The skin becomes scaly and pigmented, and in the majority of cases the affected areas are bilaterally symmetrical and are distinctly separated from the healthy skin. The affected areas of the skin sometimes cause severe burning and itching. With the advance of the disease, the skin lesion becomes swollen and more red in colour, which may be followed by desquamation of the skin. There are, however, cases of pellagra without skin lesions. Such a type of pellagra is known as 'pellagra *sine* pellagra' (pellagra without the rough skin).

The gastro-intestinal tract.—Characteristic glossitis usually appears early in the course of the disease and is characterized by redness at the tip and lateral margins of the tongue, with swelling. Ulcers may appear along the sides and tip of the tongue. Stomatitis and gingivitis also may develop. Vomiting, diarrhœa, and anorexia are very common.

The nervous system.—In the early stages of disease the person suffers from mental depression. Loss of memory, confusion, unrestrained conversation, irritability, headache, insomnia and muscular weakness are the common symptoms of the diseased person.

Distribution of pellagra in India.—Cases of pellagra have been reported in India since 1927 (Megaw and Gupta, 1927; Gupta, 1935; Stannus, 1936; Panja, 1935; Sen Gupta *et al.*, 1939; Bajaj, 1939; Swarup, 1930; Lowe, 1931, 1933; Dhayagude and Khadilkar, 1939; Mody, 1935; Raman, 1933; Rau and Raman, 1936; Raman, 1940; Naganna *et al.*, 1941). From the published literature the following figures were collected:—

TABLE

Reported cases of pellagra in India

Bombay	7
Bengal	9
Punjab	11
United Provinces	1
Hyderabad	70
Madras	40

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The figures furnished on the incidence of pellagra are undoubtedly lower than the actual incidence of the disease in this country, since there may be many cases which are not diagnosed properly, and even those which are diagnosed are not reported properly. However, pellagra does not appear to be very common in India.

The ætiology of pellagra.—Napier (1939), in an excellent review, summarizes the present knowledge of the ætiology, pathology and treatment of the disease. A number of views have been proposed from time to time to explain its cause.

Maize theory.—This theory is perhaps the oldest and is supported by many workers. As early as 1600, it was observed that certain Indian tribes in America suffered from pellagra, which was attributed to the consumption of maize. In Italy and France the incidence of pellagra followed the introduction of maize. It was, therefore, thought that maize contained a toxic substance which caused pellagra. This view was upheld for several centuries and was later abandoned in favour of dietetic deficiency as the causative factor. More will be said later on the association of pellagra with a maize diet.

The infective theory.—Another theory has been advanced, namely, that pellagra is caused by an infective organism. This theory was later given up, in view of the fact that no pellagra germ has been isolated and that all attempts to produce the disease by inoculating healthy persons with the blood of pellagrins failed.

Dietary deficiency.—That pellagra is a disease caused by a deficient diet has now been fully established by the work of several investigators. The classical work of Goldberger and his colleagues in this direction is of great importance. It was in the year 1914-15 that Goldberger and his associates succeeded in the prevention and cure of many cases of pellagra among the inmates of two orphanages, by substituting the rations of corn with liberal amounts of meat, milk and eggs. Later, several experiments were carried out on human beings and it was clearly demonstrated that pellagra could be produced by diet, and could be cured by the introduction of a modified diet. Dr. Goldberger and his associates found that pellagra could be prevented and cured by foods rich in proteins, and they believed that the disease was caused by insufficient or poor protein in the diet. This theory was later proved to be erroneous in view of the fact that the milk protein, casein, did not prevent or cure the disease. They also found that milk, beef, liver, tomatoes, and peas prevent pellagra.

Although it has been recognized for a long time that pellagra is associated with a maize diet, occasional cases of pellagra may occur among populations subsisting on cereals other than maize. As a large scale public health problem it exists only in countries in which maize is the staple article of diet. For example, in Roumania maize is the staple food and it is found that 5 per cent or more of the population in certain districts in Roumania may suffer from the disease (Aykroyd *et al.*, 1935). In India, however, where rice is the staple article of diet pellagra is very rare and the disease never assumes epidemic proportions. Raman (1940) has reported that the incidence of pellagra was 0.65 per cent of admissions to the medical wards in Vizagapatam. It is clear, therefore, that the percentage incidence of the population must be much less than this. In view of the fact that the administration of nicotinic acid improves or cures the disease, it is natural to expect that pellagra is due to nicotinic acid deficiency in the diet consumed by the population, in the same way that beri-beri is due to vitamin B_1 deficiency in the diet. It is clear, therefore, that the difference in the percentage incidence of pellagra in countries where maize and rice are the staple articles of diet must be due either to the difference in the nicotinic acid contents of the diets consumed, or to some other factors in addition to nicotinic acid deficiency. Recently, Aykroyd and Swaminathan (1940) have thrown important light on this problem. They have shown that whole maize samples, although low in nicotinic acid, are not very different in this respect from various other cereal products. They have compared the nicotinic acid content of a poor maize diet associated with pellagra, (consumed by poor Roumanian families) with that of a typical poor rice diet. The latter was estimated to contain less nicotinic acid (12 mg.) than the former (15 mg.). These findings appear to indicate that the relationship between diet and pellagra cannot be explained in terms of the nicotinic acid content of the diet alone. There must be some difference between maize and rice other than the nicotinic acid content. Further investigation on this point would be useful in throwing more light on the causation of pellagra. Possibly other factors (as yet unrecognized) play a part in the causation of pellagra.

The nicotinic acid content of foods

Methods of estimation.—Since the dietary value of nicotinic acid is established, the estimation of the vitamin in foodstuffs is a matter of great importance. The methods so far available for its estimation may be classified as follows :—

I. *Biological assay.*—The biological assay for the nicotinic acid content of foods is accomplished by the use of black-tongue dogs maintained on Goldberger diet. For details original papers must be consulted (Waisman *et al.*, 1940). The biological method is very laborious and time-consuming.

II. *Chemical methods.*—Recently many colorimetric methods have been suggested for its

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determination in foodstuffs. The usual procedure is to extract the vitamin either with alcohol or water, purifying the extract by various methods and finally to estimate colorimetrically the nicotinic acid in the extract.

Extraction of nicotinic acid.—Various methods have been adopted by several workers for the extraction of the vitamin from foodstuffs. Kodicek (1940) found that the extraction of cereals by acid gives nicotinic acid values which are much higher than that given by aqueous extracts. He suggested, however, that water extract gives the true nicotinic acid content of cereals. Leong (1940) has compared the various methods for the extraction of nicotinic acid and found that the values obtained from the acid extract and the aqueous extract were within the experimental error. For routine analysis extraction with water two or three times is advocated by many workers (Swaminathan, 1938; Giri and Naganna, 1941).

Treatment of the extract.—Very elaborate methods have been adopted by workers for removing the proteins and for decolorizing the extract. Treatment with lead acetate to precipitate proteins and their derivatives, removal of lead by treatment with sulphuric acid, evaporation to a small bulk, hydrolysis with hydrochloric acid to convert the nicotinamide into nicotinic acid, and removal of colour by treatment with charcoal, are the steps suggested by several workers (Swaminathan, 1938; Kringstad and Naess, 1939). The methods so far suggested involve many steps and lack simplicity. The charcoal which is used for removing the colour adsorbs some nicotinic acid which may vitiate the final result. It is also found that the use of lead acetate to remove proteins is unsatisfactory, some nicotinic acid being adsorbed (Ashford and Clark, 1939). Considering these defects and the time involved in carrying out the various steps, any simplification of the procedure would greatly increase the value of the methods. Recently the present writer has suggested a new method (Giri and Naganna, 1941), based on adsorption and elution of nicotinic acid, by which estimations can be carried out in a much shorter time. The steps involved in the method are extraction with water, hydrolysis with sodium hydroxide to convert the nicotinamide into nicotinic acid, and adsorption upon medicinal charcoal and elution in alcohol-sodium hydroxide solution. By adopting this procedure almost colourless solutions are obtained. Recently Friedemann and Barborka (1941) have suggested a simple procedure for the decolorization of acid digestion mixtures for the determination of nicotinic acid. The method is based on the adsorption of the colour by zinc hydroxide. By following this procedure clear and colourless solutions from blood, urine and tissues have been obtained.

Estimation of nicotinic acid.—All of the recent colorimetric methods for the determination of nicotinic acid and its derivatives in biological materials are based either on Vongerichten's reaction with dinitrochlorobenzene (Vongerichten, 1899) or Koenig's (1904) reaction with cyanogen bromide and an aromatic amine. The following reagents have been proposed by various workers for the estimation of nicotinic acid:—

1. 2 : 4-*dinitrochlorobenzene* was used by Karrer and Keller (1938, 1939) and by Vilter *et al.* (1938). It gives a colour reaction with pyridine derivatives (Vongerichten, 1899; Zincke, 1904).

2. *Aniline* was used by Swaminathan (1938), Kringstad and Naess (1938, 1939), Shaw and Macdonald (1938), Pearson (1939), Ritsert (1939), Leong (1940), Melnick and Field (1940) and Kochhar (1940). It produces a colour reaction of the type described by Koenig (1904) and Strafford and Parry-Jones (1933), *i.e.*, pyridine derivatives react with cyanogen bromide plus an aromatic amine to yield a coloured substance.

3. *Metol* (*p-methylaminophenol sulphate*). Bandier and Hald (1939) have used metol instead of aniline. The method has been employed to analyse samples of yeast. This reagent has been used by other workers with slight modification for the determination of nicotinic acid in urine (Rosenblum and Jolliffe, 1940).

4. *Naphthylamine.* This reagent was used by Barta (1935) and with slight modification by Euler *et al.* (1938).

5. *p-aminoacetophenone.* This reagent was introduced by Harris and Raymond (1939*a*, *b*) and was used as the aromatic amine for the Koenig reaction. It has since been used by various workers for the estimation of nicotinic acid in foodstuffs, animal tissues and blood (Kodicek, 1940; Giri and Naganna, 1941*a*; Arnold *et al.*, 1941). It possesses many advantages over the other reagents mentioned above. It is quite a specific for nicotinic acid and its amide; it is about 3 to 5 times as sensitive as aniline and metol; the colour is relatively stable if kept protected from light and the colour can be extracted with ethyl acetate (Arnold *et al.*, 1941).

III. Methods based on the growth of micro-organisms.—In blood, nicotinic acid has been estimated quantitatively by its growth-promoting action on various micro-organisms (Querido *et al.*, 1939).

Nicotinic acid content of foods

A knowledge of the nicotinic acid content of foodstuffs is a matter of great importance from the point of view of human nutrition. With the introduction of chemical methods for the estimation of the vitamin recently the analysis of foodstuffs with respect to this vitamin has been carried out in various laboratories. The values obtained by various workers for the nicotinic acid content of more important foodstuffs are tabulated in the accompanying table.

A study of the figures presented in the table reveals many points of interest. It will be seen that although nicotinic acid is widely

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distributed among many natural foodstuffs, only a few of them can be considered to be rich in this vitamin. Among the foodstuffs yeast is the richest source of the vitamin.

The nicotinic acid content of cereals is of special interest as they constitute the staple article of diet in India. Like vitamin B_1, nicotinic acid in rice grain is concentrated in the germ and pericarp. The polished rice, therefore, contains less nicotinic acid than unpolished rice. It has been shown that two-thirds of the nicotinic acid is lost when the rice is milled. On the other hand parboiled rice loses less of nicotinic acid on pounding and milling. Rice bran is very rich in this vitamin, containing 28 mg. per 100 grammes of the material. Rice kernel furnishes by-products which are a good source of the anti-pellagra factor. The germ layer which contains approximately 15 mg. per cent nicotinic acid is a much better source of this factor than wheat germ. Rice bran ranks close to yeast as a source of the anti-pellagra factor (Arnold *et al.* 1941). Among cereals Italian millet is very poor in this vitamin. No other cereal grain has given such a low value. This millet is consumed by the poorer classes in certain parts of South India. Among animal products, liver is the richest source of the vitamin, containing more than 10 mg. of the vitamin per 100 grammes of the fresh tissue. The nicotinic acid content of beef, pork and mutton varies between 3 and 4 mg. per 100 grammes of tissue. Among fish, salmon is found to be rich in this vitamin. Prawn and crab are also comparatively good sources of the vitamin. The nicotinic acid content of the muscle tissue of a number of Bengal fish is found to be less than 1.0 mg. per 100 grammes of fresh muscle (Saha, 1941).

Milk and milk products are very poor sources of this vitamin. Although milk has always been regarded as a good source of the pellagra-preventive factor (Wheeler and Sebrell, 1933; Sebrell, 1934), recently several workers have reported very low nicotinic acid content of milk by chemical methods (Kodicek, 1940; Leong, 1940; Swaminathan, 1941). Goldberger and Tanner (1924) found that a daily addition of 40 ounces of butter-milk to a basic diet was sufficient to prevent pellagra. Recently, however, Harris and Kodicek (Kodicek, 1940) have shown that dogs which were kept on black-tongue-producing diet did not show any improvement even after doses of 120 c.cm. of fresh milk per kg. of body-weight. This finding confirms the results obtained by chemical tests. Even human milk is found to be deficient in this vitamin. These results raise problems of great interest from the point of view of nicotinic acid requirements of the child and its relation to the metabolism of growing children. Infants require nicotinic acid for the formation of coenzymes in the body. Since milk does not provide enough of it, it would be interesting to know whether the nicotinic acid is stored in the body of the new-born child or whether it is being synthesized in the body.

Fruits and vegetables are negligible sources of nicotinic acid, containing less than 0.5 mg. per 100 grammes.

Human requirements of nicotinic acid.—Accurate figures are not available for the nicotinic acid requirements. But various clinicians have suggested values between 15 and 25 milligrammes per day. The daily consumption of one pound of unpolished rice will supply this amount. On the other hand the consumption of polished rice may not supply the necessary amount of the vitamin.

Treatment of pellagra.—Pellagra can be treated effectively by the administration of nicotinic acid, nicotinic acid amide or sodium nicotinate, either orally or parenterally, in physiological solution of sodium chloride. With regard to dosage it has been suggested that 500 milligrammes daily, administered orally in 50-milligramme doses, is a safe and effective dose for the average case of pellagra. In mild cases a daily dose of 50 milligrammes and in severe cases 1,000 milligrammes per day have been suggested (Spies *et al.*, 1939*a*). Nicotinic acid can be administered with safety in doses up to 0.3 gm. daily. The administration of large amounts of nicotinic acid to human beings is followed by marked flushing of the face, itching and tingling sensation of the skin.

The administration of liver extract in very liberal doses, yeast and foods rich in nicotinic acid is useful in treating mild cases of pellagra. A daily dose of 15 to 30 gm. of dried powdered yeast is found to cure pellagra, and the practical method of administration is in the form of pure dried powdered yeast, which may be conveniently given admixed with milk.

Some important biochemical changes in pellagrins

Changes in blood proteins, sugar, urea, Ca and P in pellagrins have been investigated by several workers, and in general it is found that blood proteins are low in pellagrins, while the other constituents occur in normal amounts.

Porphyrinuria in pellagra.—Disturbance of porphyrin metabolism is considered to be an important part of the pellagra syndrome, as indicated by the excretion of large quantities of porphyrin and porphyrin-like substances in urine (Beckh *et al.*, 1937; Spies *et al.*, 1938) and the determination of the presence of these metabolites in the urine is considered by some workers as an important test for the recognition of pellagra. On the contrary Rosenblum and Jolliffe (1940) have shown that porphyrinuria is of no value as a diagnostic or therapeutic aid in pellagra. They suggest that porphyrinuria, when present in pellagra, results from coincident liver damage. Recently, Passmore *et al.* (1940) have shown that the urinary porphyrin excretion of persons living on a poor rice diet with a low nicotinic acid intake and showing signs of

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stomatitis and glossitis was within normal limits.

Nicotinic acid, coenzymes.—The excretion of nicotinic acid in pellagrins is greatly diminished (Naganna *et al.*, 1941). Similarly the concentration of cozymase, an enzyme which is fundamental to cellular respiration, is found to be below normal in the blood and urine of several pellagrins.

Other vitamins.—The vitamin B_1 content of urine is diminished in the urine of pellagrins with beri-beri, and the amount of flavin is likewise diminished in pellagrins with riboflavin deficiency. Recently Stanbery *et al.* (1940) have shown that the blood of patients with pellagra, beri-beri and riboflavin deficiency shows a decreased pantothenic acid content. These findings suggest that pantothenic acid is important in human nutrition.

Multiple deficiencies in pellagrins.—It has been frequently observed that pellagrins suffer from not only nicotinic acid deficiency, but also from vitamin B_1 and riboflavin deficiency. Peripheral neuritis, which is often associated with endemic pellagra, is due to lack of vitamin B_1. In such cases both nicotinic acid and vitamin B_1 should be administered. Riboflavin deficiency also occurs in man simultaneously with pellagra. Recently Spies *et al.* (1939) have shown that persons who had been treated successfully for pellagra and beri-beri, but who remained on their deficient diets and were complaining of symptoms such as extreme nervousness, insomnia, irritability, abdominal pain, weakness and difficulty in walking, were treated successfully by the administration of vitamin B_6. It was found that within four hours after the administration of 50 mg. of pure synthetic vitamin B_6 in sterile physiological solution of NaCl, the patients expressed dramatic relief and increased strength and that the symptoms disappeared completely within 24 hours. One of the persons who had been unable to walk more than a few steps was able to go two miles within 24 hours after the injection of 50 mg. of vitamin B_6. These findings indicate that vitamin B_6 is important in human nutrition. It is clear from the foregoing, that pellagrins tend to have not only a deficiency of nicotinic acid, but also a deficiency of at least two other vitamins—vitamin B_1 and riboflavin and possibly vitamin B_6 also. It is likely that additional factors may be involved, which can be determined only by further investigations.

Biological rôle of nicotinic acid

Vitamins have important functions to perform in the chemistry of the cell. In the absence of vitamins, although the cells may still possess the capacity for growth and multiplication, they undergo certain structural changes. The particular cells affected by the deficiency vary with different vitamins. Thus, epithelial cells are involved in vitamin A deficiency, deficiency in the B complex affects the nerve cells; vitamin C affects all supporting tissue cells and vitamin D the cartilage cells. Nicotinic acid possesses not only the biological function of a vitamin but it also serves as an indispensable catalytic system in cell respiration. Nicotinic acid amide is the constituent of the important catalytic systems in the body known as coenzymes I and II. Coenzymes are those specific substances which increase the activity of enzymes. They are dialyzable and thermostable substances. These coenzymes play a very important rôle in the metabolic processes of the body, and it is of great importance to acquire more information concerning their physiology. Coenzyme I contains one molecule of nicotinic acid amide, two of phosphoric acid, two of pentose and one of ademine, while the coenzyme II contains all the above-mentioned constituents with one more molecule of phosphoric acid. Thus the coenzymes are pyridine nucleotides. The pyridine ring of the nicotinamide is the active group of the coenzyme and acts by alternative addition and subtraction of one molecule of hydrogen. The coenzyme thus acts as a hydrogen carrier through the reversible change.

Pyridine $\rightleftharpoons$ dihydropyridine.

The coenzymes are components of a number of dehydrogenase systems. The oxidation in animal tissues of many substances, such as lactate, malate, β-hydroxybutyrate, triose phosphate, etc., requires the presence of coenzyme I. The oxidation of these substances occurs as follows:

1. Substance + coenzyme I $\longrightarrow$ oxidized substance + reduced coenzyme I.
2. Reduced coenzyme I + carrier $\longrightarrow$ coenzyme I + reduced carrier.
3. Reduced carrier + C_2 $\longrightarrow$ carrier.

The first reaction is catalysed by enzymes, and the hydrogen is transferred to the coenzyme, which is again oxidized by another special catalyst. This special catalyst which is a new enzyme factor referred to as coenzyme factor or diaphorase (Adler *et al.*, 1937; Dewan and Green, 1937; Euler and Hellström, 1938; Dewan and Green, 1938) has been discovered, which catalyses the oxidation of the reduced coenzyme I by cytochrome and other hydrogen acceptors like lactoflavin, adrenochrome, etc. Recently Straub (1939*a*, *b*) isolated from heart muscle a flavoprotein compound which was found to be identical with the coenzyme factor (Corran *et al.*, 1939). This flavoprotein is rapidly reducible by dihydro-coenzyme I and its reduced form is in turn rapidly oxidizable by suitable carriers. Thus the coenzyme factor (diaphorase) is considered to be identical with heart flavoprotein. Although the mechanism of oxidation and reduction is the same in both coenzymes each enzyme is specific for a particular type of dehydrogenase. This coenzyme specificity of the dehydrogenases is an interesting problem in enzyme chemistry, which requires further elucidation.

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Coenzyme I is also essential for all oxido-reductions of alcoholic fermentation and lactic acid formation.

The two coenzymes are distributed in all the tissues of the body. They are also present in blood. Investigations on the relationship between the dietary intake of nicotinic acid and the coenzyme content of tissues have shown that the coenzyme content of the tissues of normal animals (dogs and pigs) remains constant, while in nicotinic acid deficiency there is a definite decrease in the coenzyme content of liver and muscle (Axelrod and Elvehjem, 1939). It is also found that the coenzyme content of the blood varies with the ingestion of nicotinic acid, both in normal individuals and pellagrins. Thus the coenzyme level of the body is reduced in pellagra, thereby reducing the capacity for oxidation-reduction processes in the body.

It is clear from the foregoing account of the biological rôle of nicotinic acid, that the function of the vitamin depends on several factors. The many oxidation-reduction processes in the body which depend mostly on the coenzymes (compounds of nicotinamide) cannot take place in the absence of coenzyme factor or diaphorase, which oxidizes the reduced coenzyme. The coenzyme is again reduced by the dehydrogenase substrate systems in the body, thereby completing the cycle of oxidation and reduction, resulting in the oxidation of many biological materials with the liberation of energy. This coenzyme factor is now shown to be a flavoprotein. Flavin is, therefore, indispensable for the active function of nicotinic acid in the living cell. It is reported that dogs on a black-tongue-producing diet to which substances containing the black-tongue-preventive factor are added, will die unless riboflavin is also present. It is probable that many pathological affections, including those of the skin occurring in animals and men suffering from faulty nutrition, may not be related to any specific deprivation. For example angular stomatitis is very prevalent among poorly fed children in India, and although foods containing the vitamin B_2 complex (yeast) have been found curative; no single member of the group has been found effective when administered in the purified state. Several workers have reported that nicotinic acid alone or with aneurin has not always been found to cure pellagra (Schimidt *et al.*, 1938; Ghalioungui and Hanna, 1938). Vilter *et al.* (1939) have reported that patients who had been cured of pellagra by administration of nicotinic acid and aneurin and were maintained on the pellagra-inducing diet and the above supplements, later developed certain nervous and digestive symptoms which were cured by the administration of riboflavin. These studies, together with many other findings by several workers, provide convincing evidence that pellagra is very complicated and is frequently the result of multiple deficiencies. It appears, therefore, that nicotinic acid is either the pellagra-preventive factor, or a provitamin or it is one of the factors that are necessary for the prevention of symptoms associated with pellagra.

Nicotinic acid content of foods

Name	Milligrammes of nicotinic acid per 100 grammes
Cereals and pulses—	
Rice (hand pounded)	2.1–4.4 (G.N.), 6.0 (L.).
„ (parboiled, home pounded).	2.7 (S.), 3.0 (S.2).
„ (milled) ..	3.2 (G.N.), 2.0–2.4 (S.), 0.9 (L.), 1.7 (K.).
„ germ ..	15–16 (A.).
„ bran ..	28, 29 (A.).
Wheat	3.1 (G.N.), 5.3 (S.1), 2.4 (L.).
„ germ (defatted)	3.4 (A.).
Barley	3.5 (L.).
Ragi (*Eleusine coracana*).	1.6 (G.N.), 3.1 (S.1).
Cholam (*Sorghum vulgare*).	2.2 (G.N.), 1.8 (S.1).
Cambu (*Pennisetum typhoideum*).	3.2 (G.N.), 2.5 (S.1).
Maize (*Zea mays*) ..	<0.6 (G.N.), 0.66–1.48 (S.1), 0.6–0.8 (K.), 1.4–2.2 (L.).
Italian millet (*Panicum italicum*).	Traces (G.N.), 0.6–0.8 (S.2).
Pea-nut (shelled, unroasted).	5.9 (L.).
Pea-nut meal (ether extracted).	22 (A.), 16.6 (S.1).
Black gram (*Phaseolus mungo*).	2.3 (G.N.).
Green gram (*Phaseolus radiatus*).	<0.4 (G.N.), 0.8 (L.).
Red gram (*Cajanus indicus*).	2.4 (G.N.), 5.3 (S.1), 0.4 (L.).
Bengal gram (*Cicer arientinum*).	2.7 (G.N.), 4.7 (S.1).
Soya bean ..	4.8 (S.1), 1.2 (L.).
Peas (dry) ..	1.0 (S.1).
Fruits and vegetables ..	<1.0 (L.).
Yeast	36.7–45.5 (B.H.), 43 (M.F.), 29–41 (A.), 60.6 (G.N.), 57.1–62.5 (S.1), 15.2–26.0 (L.), 44.5 (K.N.).
Meats and meat products—	
Mutton	4.1 (L.).
Bacon	4.4 (L.).
Beef	2.1–3.8 (L.).
„ liver ..	9.2 (A.), 7.7–25.0 (L.), 17.0 (K.), 8.6 (G.N.), 20.2 (W.E.), 20.0 (K.N.), 12.2 (B.).
„ muscle ..	2.4–2.5 (A.), 4.0 (G.N.), 4.8 (W.E.), 4.9 (K.N.), 4.3 (K.), 4.9 (B.).
„ kidney ..	5.8 (L.), 4.4 (G.N.), 6.5 (B.).
„ brain ..	4.3 (K.), 2.4 (G.N.).
„ heart ..	4.9 (G.N.), 5.9 (B.).
„ spleen ..	3.2 (G.N.), 4.4 (B.), 4.7 (W.E.).
Sheep's liver ..	10.1 (G.N.), 12.5 (S.), 15.2–25.2 (L.), 20.0 (K.).

A. = Arnold *et al.* (1941).
B. = Bandier (1939).
B.H. = Bandier and Hald (1939).
G.N. = Giri and Naganna (1941, 1941*a*).
K. = Kodicek (1940).
L. = Leong (1940).
M.F. = Melnick and Field (1940).
S.1 = Swaminathan (1938).
S.2 = Swaminathan (1941).
Sa. = Saha (1941).
W.E. = Waisman and Elvehjem (1941).

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Nicotinic acid content of foods—concld.

Name	Milligrammes of nicotinic acid per 100 grammes
Sheep's muscle ..	4.3 (K.), 2.8 (G.N.).
„ kidney ..	7.5 (K.), 6.0 (G.N.).
„ brain ..	3.2 (G.N.), 2.6 (L.).
„ heart ..	4.4 (G.N.), 8.7 (L.), 6.0 (K.)
„ spleen ..	3.8 (G.N.).
Pig's liver ..	16.0 (G.N.), 28.2 (W.E.), 11.8 (B.).
„ muscle ..	2.6 (L.), 6.2 (G.N.), 5.3 (W.E.), 4.7 (B.).
„ kidney ..	7.2 (G.N.), 6.8 (B.).
„ brain ..	6.4 (G.N.).
„ heart ..	7.3 (G.N.), 5.3 (B.).
„ spleen ..	5.3 (G.N.), 4.0 (B.).
Fowl liver ..	6.2 (G.N.), 7.2–11.2 (L.).
„ muscle ..	4.2 (G.N.).
Eggs (duck or hen) ..	0.2–0.3 (L.).
Egg, white ..	<0.05 (K.).
„ yolk ..	0.10 (K.).
Milk and milk products—	
Cow's milk ..	0.1 (L.), < 0.1–0.5 (K.), 0.82 (W.E.).
Human milk ..	<0.1 (K.).
Skimmed milk powder	1.2 (L.), 1.0 (S.2).
Fish—	
Salmon	8.4 (K.).
Herring	4.0 (K.).
Prawn	2.9 (L.).
Cuttle fish ..	0.9 (L.).
Cod	3.0 (K.).
Fresh fish muscle tissue	0.32–1.0 (Sa.).

A. = Arnold *et al.* (1941).
B. = Bandier (1939).
B.H. = Bandier and Hald (1939).
G.N. = Giri and Naganna (1941, 1941*a*).
K. = Kodicek (1940).
L. = Leong (1940).
M.F. = Melnick and Field (1940).
S.1 = Swaminathan (1938).
S.2 = Swaminathan (1941).
Sa. = Saha (1941).
W.E. = Waisman and Elvehjem (1941).

REFERENCES

ADLER, E., EULER, H., and HELLSTRÖM, H. (1937). *Arkiv. Kemi. Mineral Geol.*, **12B**, 7.

ARNOLD, SCHREFFLER and LIPSIUS (1941). *Industrial and Eng. Chem., Anal. Edin.*, **13**, 62.

ASHFORD, W. R., and CLARK, R. H. (1939). *Trans. Roy. Soc. Can.*, **33**, 29.

AXELROD, A. E., and ELVEHJEM, C. A. (1939). *Nature*, **143**, 281.

AYKROYD, W. R. (1930). *Biochem. J.*, **24**, 1479.

AYKROYD, W. R., ALEXA, I., and NITZULESCU, J. (1935). *Arch. Roumains Path. Exper. et Microbiol.*, **8**, 407.

AYKROYD, W. R., and SWAMINATHAN, M. (1940). *Indian J. Med. Res.*, **27**, 667.

BAJAJ, N. L. (1939) .. *Indian Med. Gaz.*, **74**, 145.

BANDIER, E. (1939) .. *Biochem. J.*, **33**, 1130.

BANDIER, E., and HALD, J. (1939). *Ibid.*, **33**, 264.

BARTA, L. (1935) .. *Biochem. Zeitschr.*, **277**, 412.

BECKH, W., ELLINGER, P., and SPIES, T. D. (1937). *Quart. J. Med.*, **6**, 305.

BIRCH, T. W., CHICK, H., and MARTIN, C. J. (1937). *Biochem. J.*, **31**, 1065.

BIRCH, T. W., GYÖRGY, P., and HARRIS, L. J. (1935). *Ibid.*, **29**, 2830.

CHICK, H., COPPING, A. M., and EDGAR, C. E. (1935). *Biochem. J.*, **29**, 722.

COOK, C. A., CLARKE, M. F., and LIGHT, A. E. (1937). *Proc. Soc. Exper. Biol. and Med.*, **37**, 514.

CORRAN, H. S., GREEN, D. E., and STRAUB, F. B. (1939). *Biochem. J.*, **33**, 793.

DANN, W. J., and SUBBAROW, Y. (1938). *J. Nutrition*, **16**, 183.

DEWAN, J. G., and GREEN, D. E. (1937). *Nature*, **140**, 1097.

Idem (1938). *Biochem. J.*, **32**, 626.

DHAYAGUDE, R. G., and KHADILKAR, V. N. (1939). *Indian J. Med. Res.*, **26**, 714.

ELVEHJEM, C. A., MADDEN, R. J., STRONG, F. M., and WOOLLEY, D. W. (1937). *J. Amer. Chem. Soc.*, **59**, 1767.

EULER, H., and HELLSTRÖM, H. (1938). *Zeitschr. Physiol. Chem.*, **252**, 31.

EULER, H., and MALMBERG, M. (1936). *Biochem. Zeitschr.*, **284**, 455.

EULER, H., SCHLENK, F., HEIWINKEL, H., and HÖGBERG, B. (1938). *Zeitschr. Physiol. Chem.*, **256**, 208.

FOUTS, P. J., HELMER, O. M., LEPKOVSKY, S., and JUKES, T. H. (1937). *Proc. Soc. Exper. Biol. and Med.*, **37**, 405.

FRIEDEMANN and BARBORKA (1941). *J. Biol. Chem.*, **138**, 785.

FROST, D. V., and ELVEHJEM, C. A. (1937). *Ibid.*, **121**, 255.

GHALIOUNGUI and HANNA (1938). *J. Egyptian Med. Assoc.*, **21**, 750.

GIRI, K. V., and NAGANNA, B. (1941). *Indian J. Med. Res.*, **29**, 125.

Idem (1941*a*). *Ibid.*, **29**, 585.

GOLDBERGER, J., and LILLIE, R. D. (1926). *Pub. Health Rep.*, **41**, 1025.

GOLDBERGER, J., LILLIE, R. D., WHEELER, G. A., and ROGERS, L. M. (1926). *Ibid.*, **41**, 297.

GOLDBERGER, J., and TANNER, W. F. (1924). *Ibid.*, **39**, 87.

GOLDBERGER, J., WHEELER, G. A., LILLIE, R. D., and ROGERS, L. M. (1928). *Ibid.*, **43**, 657, 1385.

GUPTA, S. N. (1935) .. *Indian Med. Gaz.*, **70**, 148.

GYÖRGY, P. (1935) .. *Biochem. J.*, **29**, 741.

Idem (1938) .. *J. Amer. Chem. Soc.*, **60**, 983.

GYÖRGY, P., GOLDBLATT, H., MILLER, F. R., and FULTON, R. P. (1937). *J. Exper. Med.*, **66**, 579.

GYÖRGY, P., KUHN, R., and WAGNER-JAUREGG, T. (1933). *Klin. Woch.*, **12**, 1241.

HARRIS, L. J. (1935) .. *Biochem. J.*, **29**, 776.

Idem (1937) .. *Ibid.*, **31**, 1414.

HARRIS, L. J., and RAYMOND, W. D. (1939*a*). *Chem. Industry*, **58**, 652.

Idem (1939*b*). *Biochem. J.*, **33**, 2037.

HARRIS, S. A., and FOLKERS, K. (1939). *J. Amer. Chem. Soc.*, **61**, 1245.

KARRER, P., and KELLER, H. (1938). *Helv. Chim. Acta.*, **21**, 463, 1170.

Idem (1939). *Ibid.*, **22**, 1292.

KERESZTESY, J. C., and STEVENS, J. R. (1938). *J. Amer. Chem. Soc.*, **60**, 1267.

KOCHHAR, B. D. (1940). *Indian J. Med. Res.*, **28**, 385.

KODICEK, E. (1940) .. *Biochem. J.*, **34**, 712, 724.

KOENIG (1904) .. *J. Prakt. Chem.*, **69**, 105.

KRINGSTAD, H., and NAESS, T. (1938). *Naturwissenschaften*, **26**, 709.

Idem (1939). *Zeitschr. Physiol. Chem.*, **260**, 108.

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KUHN, R., and WENDT, G. (1938). *Ber. Chem. Ges.*, **71**, 780.

LEONG, P. C. (1940) .. *J. Malaya Branch Brit. Med. Assoc.*, **4**, 261.

LEPKOVSKY, S. (1938) .. *Science*, **87**, 169.

LOWE, J. (1931) .. *Indian Med. Gaz.*, **66**, 491.

Idem (1933) .. *Ibid.*, **68**, 379.

MACRAE, T. F., and EDGAR, C. E. (1937). *Biochem. J.*, **31**, 2225.

MEGAW, J. W. D., and GUPTA, J. C. (1927). *Indian Med. Gaz.*, **62**, 299.

MELNICK, D., and FIELD, H. (1940). *J. Biol. Chem.*, **134**, 1.

Idem (1940). *Ibid.*, **135**, 53.

MILLER, D. K., and RHOADS, C. P. (1935). *J. Clin. Investigation*, **14**, 153.

MODY, M. S. H. (1935). *Indian Med. Gaz.*, **70**, 625.

NAGANNA, B., GIRI, K. V., and VENKATESAM, P. (1941). *Ibid.*, **76**, 208.

NAPIER, L. E. (1939) .. *Ibid.*, **74**, 136.

PANJA, G. (1935) .. *Arch. Dermat. and Syph.*, **31**, 213.

PASSMORE, R., SOMMERVILLE, T., and SWAMINATHAN, M. (1940). *Indian J. Med. Res.*, **28**, 113.

PEARSON, P. B. (1939) .. *J. Biol. Chem.*, **129**, 491.

QUERIDO, A., LWOFF, A., and LATASTE, C. (1939). *Compt. Rend. Soc. Biol.*, **130**, 580.

RAMAN, T. K. (1933) .. *Indian Med. Gaz.*, **68**, 381.

Idem (1940) .. *Indian J. Med. Res.*, **27**, 743.

RAU, G. D., and RAMAN, T. K. (1936). *Indian Med. Gaz.*, **71**, 570.

RITSERT, K. (1939) .. *Klin. Woch.*, **18**, 934.

ROSENBLUM, L. A., and JOLLIFFE, N. (1940). *J. Biol. Chem.*, **134**, 137.

SAHA (1941) .. *Ann. Biochem. and Exper. Med.*, **1**, 75.

SCHIMIDT, H. L., and SYDENSTRICKER, V. P. (1938). *J. Amer. Med. Assoc.*, **110**, 2065.

SEBRELL, W. H. (1934). *Pub. Health Rep.*, **49**, 754.

SEN GUPTA, P. C., RAI CHAUDHURI, M. N., CHAUDHURI, R. N., and NAPIER, L. E. (1939). *Indian Med. Gaz.*, **74**, 143.

SHAW, G. E., and MACDONALD, C. A. (1938). *Quart. J. Pharmacy and Pharm.*, **11**, 380.

SHOURIE, K. L., and SWAMINATHAN, M. (1940). *Indian J. Med. Res.*, **27**, 679.

SMITH, D. T., RUFFIN, J. M., and SMITH, S. G. (1937). *J. Amer. Med. Assoc.*, **109**, 2054.

SPIES, T. D., BEAN, W. B., and ASHE, W. F. (1939). *Ann. Intern. Med.*, **12**, 1830.

Idem (1939*a*). *J. Amer. Med. Assoc.*, **112**, 2414.

SPIES, T. D., COOPER, C., and BLANKENHORN, M. A. (1938). *Ibid.*, **110**, 622.

SPIES, T. D., GROSS, E. S., and SASAKI, Y. (1938). *Proc. Soc. Exper. Biol. and Med.*, **38**, 178.

STANBERY, S. R., SNELL, E. E., and SPIES, T. D. (1940). *J. Biol. Chem.*, **135**, 353.

STANNUS, H. S. (1936). *Trop. Dis. Bull.*, **33**, 729, 815, 885.

STILLER, E. T., KERESZTESY, J. C., and FINKELSTEIN, J. (1940). *J. Amer. Chem. Soc.*, **62**, 1779.

STRAFFORD, N., and PARRY-JONES, R. T. (1933). *Analyst*, **58**, 380.

STRAUB, F. B. (1939*a*). *Nature*, **143**, 76.

Idem (1939*b*). *Biochem. J.*, **33**, 787.

SWAMINATHAN, M. (1938). *Nature*, **141**, 830.

Idem (1938). *Indian J. Med. Res.*, **26**, 427.

Idem (1941). *Ibid.*, **29**, 325.

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MINOR DRUG HABITS OF INDIA

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PART II

Group II. Food and dietetic preparations, vitamins and salts

[*Continued from last issue*]

THE foods which can be used for stimulating and 'doping' purposes are those which are easily accessible and are quickly assimilated so as to provide readily extra calories for increased energy output. They include special artificial foods intended for consumption immediately before or during mental or physical exertion as they have a favourable effect upon the intellectual or muscular performance. A well-balanced diet should act like a tonic and stimulant.

The average balanced diet for an adult in this country aims at an energy output of 3,000 calories. It should contain 398 grammes of carbohydrate, 112 grammes of fat, and 90 grammes of protein. The mineral contents of the diet are also important; they should contain 0.90 gramme of calcium, 1.25 grammes of phosphorus, and 15 to 20 milligrammes of iron. When these requirements are not fulfilled there may be a feeling of exhaustion and hence the need for artificial stimulation. The best method, therefore, would be to supply these requirements in sufficient quantities or in excess, if a greater output of energy is to be expected. Carbohydrates are considered to be most suitable if increased muscular activity is the object. Recent experiments have shown that during muscular effort, there is a drop in the sugar content of the blood which is due to using up the reserve carbohydrates in the body. Further, it has also been proved experimentally that protracted muscular effort induces hypoglycæmia which may lead to such an advanced degree of exhaustion that the work may have sometimes to be stopped. When, however, glucose or a hot cup of tea containing a lot of sugar is consumed, the physical capacity of such an exhausted individual is again

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SWARUP, A. (1930) .. *Indian Med. Gaz.*, **65**, 440.

VILTER, S. P., SPIES, T. D., and MATHEWS, A. P. (1938). *J. Biol. Chem.*, **125**, 85.

VILTER, R. W., VILTER, S. P., and SPIES, T. D. (1939). *J. Amer. Med. Assoc.*, **112**, 420.

VONGERICHTEN (1899) .. *Ber. Chem. Ges.*, **32**, 2571.

WAISMAN, H. A., and ELVEHJEM, C. A. (1941). *Industrial and Eng. Chem., Anal Edn.*, **13**, 221.

WAISMAN, H. A., MICKELSEN, O., MCKIBBIN, J. M., and ELVEHJEM, C. A. (1940). *J. Nutrition*, **19**, 483.

WARBERG, O., and CHRISTIAN, W. (1935). *Biochem. Zeitschr.*, **275**, 464.

WHEELER, G. A., and SEBRELL, W. H. (1933). *Nat. Inst. Health Bull.*, No. 162, p. 1.

WOOLLEY, D. W., STRONG, F. M., MADDEN, R. J., and ELVEHJEM, C. A. (1938). *J. Biol. Chem.*, **124**, 715.

ZINCKE (1904) .. *Liebigs Ann.*, **330**, 361.

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replenished. Thus we find that it is quite common in India to take glasses of sharbat (syrup in water), *i.e.*, drinks containing a lot of sugar in solution in between hard physical efforts especially during the hot weather. Ordinary sugar appears to act as effectively as glucose.

Lecithin is well known for its stimulating effects and eggs, which are very rich in this substance, are therefore commonly used for this purpose. Doubts have been expressed by some authorities as to the efficacy of lecithin when given by mouth. It is believed that this substance is decomposed in the gut and is not absorbed. We have found that ovo-lecithin when given to opium addicts by mouth or parenterally in the form of a 2 per cent solution, greatly ameliorated the withdrawal symptoms, the sense of exhaustion and general depression, during the period of abstinence.

In addition to the proximate principles, a balanced diet should contain 3,000 to 5,000 international units of vitamin A, 400 international units of vitamin B, 250 international units of vitamin C and an undetermined amount of vitamin D, a day. An adequate supply of vitamin A in the diet is essential for satisfactory growth in childhood, and for maintenance of normal resistance against infection. Decreased sensitiveness of the retina and night blindness are common results of vitamin-A deficiency, and recent work has shown that the Indian dietary is deficient in vitamin A. The poor classes in India usually have very little fat in their diet. This vitamin is now available in concentrated form in such preparations as Adoxalin but it is very expensive.

Vitamin B plays an important rôle in our daily diet. It has been established that the typical Indian diet contains 160 international units of vitamin B, while a well-balanced diet should contain at least 400 international units. Partial deficiency of vitamin B causes wasting of the gastro-intestinal tract, and lack of appetite and atony of gastro-intestinal tract are well-known sequelæ of the vitamin-B deficiency. Persons with gastro-intestinal atony, and especially with achlorhydria, often have a vitamin-B deficiency in spite of the usual balanced diet. In such cases improvement in general functional capacity follows the addition of vitamin B to their diet. The common practice with athletes and sportsmen is to take an orange or other fruit at intervals between the periods of exertion. Vitamin B plays an important part in carbohydrate metabolism. The more sugar or starch we eat, the more vitamin B we need to oxidize it. Naturally oxidation of sugar is necessary not only for the use of the central nervous system, but also for the muscles. When the voluntary muscles are fatigued we rest them, but there is one muscle that cannot rest and that is the heart, therefore, its need of vitamin B is more urgent. Heart failure is common in weak, debilitated, over-worked and fatigued individuals and those who constantly use alcohol and other drugs as stimulants. This can often be remedied promptly by large doses of vitamin B. Some authorities have observed that by the administration of yeast extract, the glycogen content of the liver and muscles can be increased. The diet of athletes and those who have to undergo hard physical strain should, therefore, contain an adequate allowance of this accessory food. No direct increase in the physical efficiency should be expected from an excess of vitamin B, apart from proper regulation of the carbohydrate metabolism, which is essential during muscular exercise. There are at present many preparations such as Bemax, Betaxin (Bayer), Betabion (Merck) by which vitamin B can be administered in a concentrated form. They have a special value in cases of anæmia, debility, gastro-intestinal diturbances, fatigue, and the sense of depression produced in such conditions as epidemic dropsy. Vitamin B is of value in relief of anorexia and also aids in the assimilation of food. It helps in promoting normal growth in infants, and it is essential for the prevention and treatment of some forms of polyneuritis, in which condition there is definite disinclination for exertion. Vitamins are not likely to cause injury to the system, except vitamin A which given in excess may lead to toxic effects.

Vitamin C also plays an important part and there are quite a number of conditions which are attributable to the lack of this substance, the chief among them being scurvy. Most of the Indian dietaries are adequately supplied with this vitamin.

Vitamin-D deficiency produces rickets, which is not so common in India as in temperate regions. There are certain areas in crowded towns, such as Bombay, where rickets and osteomalacia occur. Vitamin D in concentrated form is sold as irradiated ergosterol.

The use of vitamin preparations as dopes is becoming increasingly popular in this country and a large number of vitamin preparations are on the market. It must, however, be realized that their utility is limited in India. The dietaries in many parts of the country are deficient in proteins and fats, but green vegetables are available in most places. Although the vitamin content is generally adequate in diet for normal requirements, there is always need for extra supplies, either through natural sources or through vitamin preparations, to meet such periods of emergency as pregnancy, lactation, and infancy, when growth is rapid. A little excess of vitamins consumed will not do any harm, but may be beneficial when extra demand arises. Excessive use of concentrated vitamin preparations such as are being prescribed by medical men and are even being used by the laity habitually, cannot do any good and although the effects of excessive indulgence in case of all vitamins have not been worked out, the possibility of their doing harm cannot be overlooked. It should be realized, however, that the amount of vitamins required to preserve normal health is very small, perhaps a fraction of a milligramme a day. Doping with large quantities of concentrated preparations may, therefore, not only do no good, but may do harm.

Phosphates.—In this country phosphates are commonly used in the form of Grimault's syrup which contains hypophosphates of lime, and those who take this preparation find it soothing to their nerves and imagine it improves the general tone of the body. Such persons are generally asthenic with weak constitutions.

Phosphates when given by mouth produce a feeling of freshness, well-being and inclination for work, which may amount to euphoria. But when taken in large doses they may produce sleeplessness and diarrhœa. In Europe the most common preparation which is used for such purposes is a form of primary sodium phosphate 'Recresal'. Recresal was used by Poppelreuter himself for several years in daily doses of 3 to 20 grammes, and he felt much better during the period he used this drug. When it was stopped he felt discomfort and disinclination for work. Apparently phosphates improve the general tone of the nervous system, but it is difficult to make any definite assertion from the above experiment as suggestion may also play some part. The dosage used by this worker varied from 5 to 8 grammes per day.

Calcium.—Salts of calcium are reputed to improve muscular energy. It has been found that the output of isolated muscles can be greatly improved by addition of calcium salts to the perfusing solutions. Calcium deficiency is frequently seen in some Indian diets, especially those of the South Indians, and it is often supplemented by taking a paste made of lime with betel or by itself. Calcium plays an important part in the body metabolism and its deficiency may lead to serious consequences. Calcium ions are present in all the body tissues and have an important function in maintaining the proper permeability of the cell membrane and normal neuromuscular excitability. Deficiency of calcium gives rise to poor appetite and defective nutrition as well as increased nervous and muscular irritability. Besides the above conditions where calcium is deficient, there are other cases with a normal calcium level in the blood, which are also likely to improve by its administration. They are highly strung nervous individuals who have hyperactive reflexes and crave for stimulation. These persons frequently over-indulge in such stimulants as coffee, tea, opium, cocaine and hydrotherapy. The present authors have found that such individuals were benefited by

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taking calcium gluconate although the calcium content of the blood was normal.

Doping with calcium salts, such as is found in South India, has a rational basis, but it is often carried to excess and may lead to harmful effects.

Sodium chloride and alkalies.—Alkalies can be taken with advantage during heavy physical strain and are commonly given in the form of sodium carbonate. It is believed that during muscular effort there is a fall in the blood alkali reserve, due to lactic acid production. This is a question which still requires investigation; no definite opinion on it can be given.

During strenuous physical exertion, especially in hot weather, there is a great drain of salts from the body fluids, more particularly sodium chloride; this may be so excessive as to produce symptoms described as stoker's or miner's cramps. In such cases, addition of extra salt to the diet ameliorates these symptoms. People who are in the habit of doing hard physical work under conditions of extreme heat often get into the habit of doping themselves with large quantities of common salt. This undoubtedly is useful, but should not be carried to excess.

Laxatives.—In these days newspapers and magazines are full of many attractive advertisements of a number of laxative drugs. The mode of life in large towns, lack of exercise and the general dietary of the people lead to sluggish action of the bowels, and constipation is the result. Laxative drugs are, therefore, used habitually by many people and we know many individuals who take a dose of salts or such laxatives as cascara sagrada or senna, daily, to keep themselves fit. These are examples of border-line cases of drug habit. In many of these cases a large psychological element can be demonstrated, the patient feeling miserable and unwell unless he takes his usual dose. With proper regulation of diet and exercise such persons can easily stop the habitual use of such drugs.

Group III. Substances used as accessories to foods: purine derivatives

It is well known that caffeine and other purine derivatives are widely used as stimulants in connection with physical and mental exertion. They are used either in the form of pure alkaloids or in the form of tea, coffee, or chocolate.

Tea.—The use of tea as a stimulating and refreshing beverage is perhaps more common throughout the world than any other substance of similar nature. During the last three or four decades, the habit of tea-drinking has spread through the length and breadth of India, and it has become the commonest of all the beverages used in this country. According to a moderate estimate between 10 to 20 million people in this country take tea habitually.

The earliest reference of the use of tea dates from the year 519 A.D. when it is stated that Darma, who went to preach the Buddhist religion in China, discovered the wonderful properties of the plant. It was not till the end of the sixteenth century that the rest of the world became acquainted with the properties of tea, although it had been extensively employed in China since the fifth century. It is difficult to say whether the knowledge of tea originated in China or whether it came from Assam in India. Towards the end of the eighth century, in the time of the Tang dynasty, taxes on tea were first imposed. At the beginning of the ninth century it reached Japan. Its use as a stimulating beverage spread to Tibet and Mongolia, and thence in a westerly direction to Europe. In 1616, the East India Company sent two pounds of tea to King Charles II of England, and some time later one kilogramme was sold there for £3 sterling. In 1636 the first advertisement of tea appeared in the 'Mercurius Politicus' as follows:—'The excellent Chinese beverage, recommended by all doctors, which the Chinese call "teha" and other nations "tary" or "the", is on sale in the Café of the Sultana near the Royal Exchange.' Shortly afterwards tea was praised in Latin verse and found its highest eulogy in a book by a Berlin author:—'A cup of tea is a medium for ensuring health and long life.' The Dutch doctor, Bontekoe, who later became the physician of the Prince Elector of Brandenburg, prescribed one hundred to two hundred cups a day. He himself drank tea day and night.

Chemistry of a cup of tea.—The two chief constituents of tea are caffeine and tannin. In addition there are minute quantities of minerals and a volatile oil, which have been identified, but whose action has not been fully determined. The latter is present in very small quantities and is associated with valerianic acid, phenol, pyridin, and certain nitrogenous aromatic substances. All these play an important part in the fragrance of a cup of tea, but their physiological effects appear to be negligible.

Caffeine is the chief alkaloid; it possesses well-known powers of stimulation of the higher centres of the brain and the kidneys causing diuresis. The amount of caffeine in an ordinary six-ounce cup of tea, infused for five minutes, is about one grain, compared with about two and a half grains in the same volume of coffee. A longer brewing does not increase the amount in a cup of tea to any great extent, since caffeine is very soluble, and three-quarters of the amount in the tea leaves are dissolved out in the first three minutes. Hence the addition of fresh hot water to tea, which has already been infused, gives a less stimulating brew.

Tannin is the next most important component to caffeine, and posssesses the properties of coagulating proteins and gelatine, to form insoluble tannates; it is responsible for the astringent action of tea. Tannin contained in tea, however, differs both in its chemical structure from ordinary tannic acid and its percentage also varies in different brands of tea. The tannins of tea are much less astringent than the tannic acid of the pharmacopœia. The quantity of tannin in an ordinary cup of black tea is about two grains, often less. A five-minute brewing extracts about one-third of the tannin; a longer brew increases the amount, but only to small extent. Tannin is a most important factor, being responsible for the colour, pungency, and 'briskness' of tea. Some teas, however, contain much less tannin than others, but have qualities such as aroma and fragrance which still keep them in the class of good tea. The caffeine content varies less than the tannin. Chemical analysis cannot be depended upon as a guide to the quality of a tea. The tea taster's sensation is more important in judging a particular sample of tea than anything else.

The writers carried out investigation themselves and on a series of persons to find out the effects of different kinds of tea and the effects of brewing for varying periods. Two forms of tea were used: (*a*) good Darjeeling and Assam tea, and (*b*) a cheaper brand of the above. An equal quantity weighing about 40 grains, was used in each case with an equal amount of boiling water and each was allowed to brew for five or ten minutes, as the experiment required.

It was observed that good tea (Darjeeling pekoe), after five-minute brewing, produced pleasurable effects in almost all cases; except perspiration, no other symptoms were observed. The effect of taking the same brew after cooling produced similar effects without perspiration. With milk and sugar added, the same pleasurable effects were noted. When the tea (Darjeeling orange pekoe) was brewed for over 10 minutes it had a slightly astringent taste but this could be concealed by adding milk and sugar, and it gave rise to similar pleasurable stimulation as in the above case.

In case of cheap loose bazaar tea, after five-minute brewing, the taste was even better than that of the good brand, except in a few cases slight bitterness, a

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peculiar taste and slight degree of nausea were observed. When milk and sugar were added, the bitter taste was removed and it gave rise to a pleasant feeling with no other effect. Full effects developed within half an hour of taking it. Roughly speaking, there was 10 to 15 per cent increase in mental and muscular output after using a short infusion of a high grade tea such as orange pekoe. It would, therefore, appear that good Indian tea brewed for five minutes, produces mild and pleasant stimulation, except in those who are hypersensitive to it or who indulge in it to excess. Tea agreeably excites the central nervous system, slightly raises the normal cerebral activity without resulting in a subjective impression of compulsion, *i.e.*, an activity which cannot be mastered by the individual. These favourable effects are seen even in cases where under normal circumstances fatigue would have diminished the active capacity. Besides giving rise to a mild degree of euphoria, tea improves judgment and helps in intellectual work. Strong tea (brewed 10 minutes) may produce some mild discomfort, but the addition of milk hides this. Cheap Indian tea suits the palate of the masses in this country and produces no objectionable effects, but in strong infusion it is apt to be unpleasant. These effects were observed in moderate tea drinkers. There is no doubt that abuse of concentrated infusion of tea is liable to call forth physical disorders of a general nature in persons susceptible to its action.

Coffee.—Coffee is a common stimulating beverage used in Southern India, where it has replaced all other beverages. There are millions of people in this country who take this beverage habitually.

Coffee has been known for a long time to the Arabs and the Persians as a substance endowed with marvellous properties. It is said to have been presented by the Archangel Gabriel to Prophet Mohammed when he was sick. It is said that the prior of a Mohammedan convent was told by his shepherds that goats that had eaten the beans of the coffee plant remained awake and jumped and gambolled about at night. This gave him the idea of preparing a beverage for himself and his dervishes in order to keep awake during the long night prayers in the mosque. The beverage was called *kahweh*, *i.e.*, that which stimulates or suppresses the appetite for food. Coffee was used by almost the entire population of Asia Minor, Syria and Persia in the sixteenth century.

Coffee, owing to the presence of 2.6 per cent of caffeine in it, is regarded as a destroyer of care and sorrow. The condition of cerebral excitation may increase with large doses and may produce delirium. Excessive indulgence is liable to give rise to a state of chronic excitation in the form of delirium, vertigo, tremor and even convulsions.

Personal disposition plays a very important part in the manifestation of the undesirable effects of coffee. The evil properties which many persons attribute to coffee and other substances containing caffeine, are nothing but the result of their own constitutions, or innate or acquired idiosyncrasies which evoke in them abnormal reactions. It exercises a gentle stimulating influence on the brain, and in this way the tendency to sleep is diminished. Mental capacity and perhaps also the imagination are agreeably augmented. Coffee inhibits the appearance of fatigue, or at least makes it less perceptible, and in this way tends to increase the capacity for work and general activity without exerting any powerful effect on the cerebral centres. In the same gentle manner the activity of the heart in healthy persons is augmented. As soon as these effects become evident, any feeling of general depression and weakness may be dispersed and the working capacity of the muscles stimulated for a certain time. This state is not succeeded by a subjective feeling of fatigue. It is an open question whether the process of metabolism is modified in any direction, as some have stated. The personal experience of millions of coffee drinkers in all parts of the world testifies to the stimulating action described.

The habitual drinking of infusion of caffeine-containing plants is not always attended with injurious effects, as it does not in any way disturb the personality of the individual. Coffee exercises a stimulating action on the brain which results in an increased activity, whereas spirits habitually taken have a more or less permanent effect upon the central nervous system. Caffeine beverages, in moderate amounts, do not cause the drinker to deteriorate either physically or mentally. Even in cases where evident abuse of the beverage has taken place, the functional disorders are with a few exceptions soon adjusted. There is an excessive state of brain excitation which becomes manifest by a remarkable loquacity sometimes accompanied by accelerated association of ideas. This state occurs not infrequently at coffee parties where the beverage is indulged in to excess. It may also be observed in coffee-house politicians who drink cup after cup of black coffee and by this abuse are believed to be inspired to profound wisdom on all earthly matters. Daily consumption of very large amounts of concentrated infusions even of pure coffee over a long period must give rise to evil consequences. These are not only due to the aromatic substances formed during the roasting process, such as caffeol, pyridin, furfurol, furfuraldehyde, mono- and trimethylamin, etc., but also to caffeine itself. Gastric disorders, headache, a state of nervous excitement with insomnia or restlessness, by which the heart is sometimes affected, may occur. Less frequently a state of general weakness accompanied by depression or trembling of the muscles may be produced. Rarely coffee abuse has been known to cause diplopia or weakness of sight, tinnitus aurium, angina pectoris, dyspnœa, pains in the testicles and prostatitis. It has frequently been stated that the drinking of coffee diminishes sexual excitability and gives rise to sterility.

Discussion.—From the foregoing description it appears that infusions from plants containing caffeine and other purine derivatives are widely used as stimulants in connection with physical and intellectual effort. They are used in the form of coffee, tea, or chocolate. Caffeine stimulates the central nervous system; it increases the reflex responsiveness of the motor areas of the cortex and exerts a favourable influence upon mental functions, especially under conditions of intellectual strain. It also shortens the reaction-time to tactile and visual sensory stimuli and accelerates the normal process of association. Although caffeine is an important constituent of A.P.C. powder, which is often taken to relieve fatigue and pain, it is rarely used by itself.

The action of caffeine on the heart is chiefly manifested in an increase of the absolute strength of that organ and in a dilatation of the coronary vessels. Breathing is intensified as a result of the stimulation of the respiratory centre, and ergographic tests performed on particular groups of muscles have shown that caffeine and products containing that substance improve the efficiency of the muscles. In view of its known pharmacological properties, caffeine might be expected to improve mental and physical performance in certain circumstances. This question has been fully investigated by various workers. It has been shown that caffeine had no effect so far as brief physical effort is concerned. After administering caffeine to 46 subjects before a 100-metre race, it was observed that the time recorded was no better. Work tests on the cycle ergometer show, on the other hand, that when caffeine is administered, a large aggregate amount of work can be performed before exhaustion sets in. In tests involving an output of 825 kilogram-metres of work per minute, it was found that after the administration of caffeine (0.2 gm. of caffeine sodio-salicylate), the total time during which the exercise could be continued was extended by a few minutes and that efficiency was somewhat greater.

Tea and coffee are being taken habitually by millions of people in this country. Observations

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by the authors show that, taken in moderate quantities, these beverages not only do no harm, but actually are beneficial from the point of view of output of physical and intellectual work. Cases of excessive indulgence are rarely found and even in these we have not seen any serious damage to the system; cutting down the quantities taken at once stopped any untoward symptoms.

The authors have studied the effects of Indian coffee on the circulatory system. Experiments were made on a Punjabi medical student and an athlete who was the winner of all the principal sports items in a tournament. The pulse rate and blood pressure were recorded before and after a half-mile race and other events. It was found that the administration of a cup of coffee did not affect the pulse and blood pressure in any way. The only symptom which was noticed was a feeling of alertness before starting the event. It is not possible to draw from these experiments any conclusion regarding the effect of coffee. Nevertheless, we are of opinion that the excessive use of caffeine-containing beverages before undertaking any physical exertion should not be encouraged.

It is very difficult to determine how far pure caffeine or purine derivatives in the form of coffee, chocolate and cocoa, given to athletes in normal therapeutic doses as a physical stimulant, can endanger their health. But it seems likely that any substance capable of stimulating the body to exertion beyond the limits set by the normal sensation of fatigue will prove injurious.

Betel leaf and areca nut (pan-supari)

Historical and general.—Pan (*Piper betel* Linn.), the chief ingredient of the betel morsel (*pan-supari*), belongs to the natural order *Piperaceæ* and is widely cultivated in Madras, Central Provinces, Bengal, Orissa, Bombay, U. P. and Burma. The use of betel leaf can be traced as far back as two thousand years. It is described in the most ancient historic book of Ceylon, the *Mahavasma*, which is written in the Pali language. It is mentioned that in the year 504 B.C. a princess made a present of betel to her lover. During the combat between Duthagamini and the Malaharis in the year 161 B.C., his enemies seeing his blood-red lips due to chewing of betel, got the erroneous impression of having wounded him.

About 340 B.C. Theophrastus described the areca palm (*Areca catechu* Linn.) the nut of which forms a component of the betel morsel. This palm is also mentioned in Sanskrit under the name of *guvaka* and is referred to in Chinese texts about 150 B.C. as *pinlang*, a Malayan name which it still bears at the present day. Betel was extensively used in India and the Arab and Persian visitors in the 8th and 9th centuries found this habit deeply rooted in this country. The use of betel in Persia, however, is much older. The Persian historian Ferishta writes that there were 30,000 shops for the sale of betel alone, in the capital town Kanvakubia, during the reign of Khosru Parviz (*i.e.*, Chosroes II, A.D. 600). Masudi, who travelled in India in 916 A.D., describes the chewing of betel as a national custom which even those who voluntarily ascended the funeral pyre practised as a final comfort. He also mentions that areca nut was highly valued by the inhabitants of Mecca, Yamen and the Hejaz who substituted it for mastix. Marco Polo (1300 A.D.), who travelled in Central Asia, China, India and Persia, and Ibn Batuta (1400 A.D.), who visited the whole Mohammedan world, described the growth and the use of betel in India and the bad effects which followed.

Medicinal properties.—*Pan* or betel leaf (*Piper betel*) has been described from ancient times as an aromatic stimulo-carminative (*Katu*), astringent and aphrodisiac (*Kamagnisandipanam*). The leaf produces an aromatic volatile oil containing a phenol called *chavicol* which has powerful antiseptic properties. The alkaloid arakene has properties resembling cocaine in some respects. The betel leaf is believed in as a common household remedy for various ailments. It is sometimes applied over the temporal regions for its analgesic and cooling effects to relieve intense headache. A local application is recommended for inflammatory swellings such as orchitis, arthritis, mastitis.

The application of leaves smeared with oil is said to promote secretion of milk when applied on the breasts of lactating women. In pulmonary affections of childhood and old age, leaves soaked in mustard oil and warmed are applied to the chest in order to relieve cough and dyspnœa. Its local application is considered to be a useful adjunct in the treatment of hepatitis, orchitis and sore throat. The fruit is sometimes mixed with honey and taken as a linctus to relieve irritating throat cough.

Supari (*Puga*), *i.e.*, areca or betel nut (*Areca catechu*), has been used as a stimulant, astringent and a vermifuge (*Kriminashak*). It is also prescribed to increase the flow of saliva, harden the gums and sweeten the breath. It contains tannic and gallic acids, oily matter and three alkaloids. Many people use it habitually as a masticatory without *pan*. The powdered nut is useful in checking diarrhœa and is believed to possess aphrodisiac properties. It is used as an astringent in bleeding gums and for stopping watery discharge from the vagina (*superi-pake*). A piece kept in the mouth allays thirst. The young fresh undried nuts, when chewed by those who are unaccustomed to its use, produce a feeling of faintness and giddiness, owing to the alkaloids. By drying it under the sun or boiling in water these effects are considerably lessened.

Betel and supari in social life of Indians.—*Pan-supari* plays an important rôle in the daily social life of Indians. The custom of offering it to guests and visitors is a common courtesy amongst Orientals and has been prevalent in many parts of India from very ancient times and it exists amongst all sections of society to the present day. It is a common custom to offer *pan-supari* before and after meals to guests, and on account of its carminative and sialogogue properties it is a digestive when taken after a heavy meal. *Pan-supari*, especially the *pan*, is very commonly recommended by Ayurvedic physicians to stimulate sexual desire. Partly owing to its aphrodisiac properties and partly on account of its deodorant and exhilarating properties, *pan-supari* came to form a part of the ritual, with which a wife welcomed her husband. This custom still exists to some extent amongst certain sections of society. In some of the religious books of Hindus the duties of a wife are described in the following terms:—

'The housewife must light the lamp and nicely prepare the bed. She must put on clean clothes, apply *sindhura* (vermilion) to her forehead and chew *pan* mixed with the usual spices. She must give him milk boiled with sugar, nutmeg, saffron, almond and musk and also betel nut and spices wrapped in *pan*' (betel leaf).

This use of betel morsel sweetens her own breath and produces exhilaration and aphrodisiac effects in the husband. This custom has spread to prostitutes who offer *pan-supari* to their visitors. The custom of chewing betel morsel is widely prevalent in certain parts and there are many persons in this country who chew it all the time they are awake. It is carried and is offered to friends just as Europeans offer cigarettes. While the leaf possesses aphrodisiac properties the thin stalk is believed to have contrary effects, and is supposed to produce sterility. This is why it is removed when the morsel is prepared.

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Extent of its use.—No other substance is craved for in the East with the same ardour as a betel leaf. There are many betel chewers who would rather give up their food than forego the betel morsel. The enormous extent of the practice of chewing betel in this country and the large quantities consumed give it an important position amongst accessory food substances. The areas of highest consumption are the eastern and southern parts of the Konan coast, Kanara, the Malabar coast as far as Cape Comorin, Travancore, Ceylon, Coromandel coast, Assam and Bengal. The use also extends to the Central Provinces, the Punjab, the United Provinces and the south-east Himalayas. On the west its use extends right up to the river Indus. According to a moderate estimate there are between 5 to 10 million betel chewers in this country. It is not consumed to the same extent in all parts of the country. Its use, for instance, is more extensive on the east coast than in the interior and northern parts of the country. In parts of the Punjab and North-West Frontier Province, the practice is considered a luxury and it is taken only on festive occasions. The passion for the leaf is common to all, both men and women of all ages, classes and religions. The habit is often started during childhood and may be continued till death. In Assam there are certain tribes who consider that no one can speak Assamese until he begins chewing betel. There are many who chew it at all times, at work or rest.

Modes of preparation and consumption.—Betel morsels are not always prepared fresh, but ready-made morsels are kept at home and also for sale in the betel shops. In many households it is regarded as a duty of the female members to prepare and offer it to the family and guests, and a small box containing the implements and ingredients necessary for preparing the morsel is kept ready. The betel leaf is consumed in a fresh state, the old deteriorated leaves are believed to lose their properties. Frequent moistening preserves the plucked leaves and keeps them fresh for weeks; the leaves which by this process assume a yellowish colour are preferred. The betel morsel presented to visitors on ceremonial occasions is composed of a piece of areca nut and a certain amount of burnt lime, a few spices and aromatics, and it is very often covered with gold or silver leaf. Some people add tobacco in addition to the ordinary constituents. In the process of chewing, the morsel is pushed from one side of the mouth to the other, it is masticated, pressed against or between the teeth in order to remove the juice, and it may protrude between the lips. The amount of different ingredients in the morsel differs with individuals. The areca nut constitutes one half or even more of the total weight of the morsel, the balance being made up with betel leaf, spices and lime. Generally one large betel leaf or one and a half of the smaller leaves are used in making one morsel to which half to one grain of lime is added. The maximum amount consumed in one day may amount to two hundred leaves in adults, these contain approximately 20 to 30 nuts; moderate consumers may use from two to ten morsels.

Pharmacological effects of betel chewing

Symptomatology.—The present writers have carefully studied over one thousand individuals who were in the habit of taking betel morsel habitually. This series included persons of all ages, races and occupations. The following description of the symptomatology from using the betel morsel is based on personal observations recorded in this series :—

The first apparent effect of the process of chewing *pan* is an abundant flow of saliva which mixes with the constituents of the morsel. Some people spit it out while others swallow it. The process of chewing is repeated for some time and in the case of a hard nut, there may be some difficulty in cracking it. The morsel is chewed until only a few ligneous fibres are left, which are thrown out. Persons who are not accustomed to the habit may experience a disagreeable, acrid and burning taste, and a feeling of constriction in the throat just after taking it. It may lead to roughness or even slight ulceration of the tongue and the buccal mucosa. These unpleasant effects are less and less apparent as the individual becomes accustomed to the habit, and they are followed by agreeable sensations and a feeling of well-being. The perception of taste also becomes temporarily dulled on account of the presence of the essential oil contained in the leaves, and to the astringent action of the lime. The red coloration of the saliva is due to the colouring matter of the nut, which manifests itself under the influence of the alkali of the lime. The usual mixture of areca nut, betel leaf and lime imparts a red-brown colour to the saliva, while the morsel containing betel leaf, areca nut, gambir, catechu, and lime gives rise to blood-red colour. After the initial effects of the excitation of the salivary glands and the irritation of the mucous membrane of the mouth have passed off, a pleasant odour lingers in the mouth which is regarded as one of the charms of this habit. Besides the pleasant odour in the breath, the morsel produces a mild degree of general stimulation. In those who are not accustomed to the use of areca nuts a sensation of uneasiness, stifling (sometimes amounting to faintness), tremors and sweating is often produced. The symptoms are not of long duration and disappear within 10 to 20 minutes. The stimulating effects upon the central nervous system are mainly due to the areca nut which contains an active principle, the volatile alkaloid called *arecoline*. This substance produces a state of excitation of the central nervous system, leading to increase of the reflexes and eventually convulsions followed by paralysis. The respiration becomes more frequent and the heart is often slowed. The nervous effects may vary in different individuals and animals according to disposition. Dogs, for instance, after ingestion of areca nut exhibit extreme excitement; frogs on the other hand show symptoms of depression.

The effects may also vary according to the nuts used; raw nuts produce vertigo and a sense of intoxication resembling that experienced after alcohol; with old nuts these effects are not nearly so marked. The variation in the effects produced is due to differences in the arecoline content of the nuts. Besides the active principle of the areca nut, the essential oil of the betel leaf also produces in animals a primary excitation followed by a kind of intoxication. It enhances the effects of areca nut and acts synergistically upon the central nervous system. In addition to the above two main ingredients, the alkaline reaction of the lime plays an important part in liberating the alkaloid arecoline from areca nut. In this way lime also plays an important rôle in enhancing its nervous effects.

Effect on muscular output.—The present authors have carried out series of tests to investigate the effect of betel morsel on muscular and mental work, betel morsels with and without areca nuts in the fresh and dried state being used. There was no question of suggestion as the taste was made identical by the use of spices and flavouring agents and the subjects under test were quite unaware of difference in ingredients. The first part of the test consisted in establishing a certain degree of fatigue by riding on a bicycle along a road. Two pieces of betel morsels with different

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ingredients were then given, work was resumed after a rest of half an hour, and was pursued until complete exhaustion set in; the time of exhaustion was recorded in each case. The pulse rate and the blood pressure were also recorded in certain cases and the general condition was noted. The total amount of work done was also noted in different cases. The pulse and the blood pressure were not much affected, but it was found that the working capacity was slightly increased by betel leaf. This was further enhanced by 10 to 15 per cent when the morsels prepared with fresh areca nuts are used.

Effects on mental efficiency.—Efficiency tests were carried out in twenty normal individuals, most of them being clerks and medical students from the Punjab, where the betel morsel is used in moderation.

Three series of experiments were conducted on each individual. In the first series, individuals were asked to add the figure 19 to each of a series of 23 digit numbers selected from a long list of small figures. In the second series of experiments they were asked to multiply two-digit numbers with 6, and add 7. In the third series they had to add 4- to 2-digit numbers, multiply it by 5 and then subtract 12. In each of these experiments the time taken for the calculation was accurately noted with a stop-watch and this was compared with that obtained after chewing 2 morsels of *pan*. Similarly the number of errors committed before and after *pan* chewing was also recorded. The following results were obtained: In experiment I, the average time taken and the number of errors committed in solving the problem before *pan* chewing were 2.98 seconds and 2.25 errors against 2.38 seconds and 1.25 errors after taking two morsels of *pan*. In experiment II, the average time required for solving the problem was 5.2 seconds and the number of errors committed 2.1 before chewing *pan*, whereas these figures were 4.59 seconds and 1.7 errors respectively after taking two *pan* morsels. In experiment III, the time taken for the calculation was 8.7 seconds and number of errors 3 before, and there were 7.25 seconds and 1.7 errors after *pan* chewing. It would appear from these experiments that small and moderate doses of *pan* slightly stimulate the mental faculties, resulting in quicker solution and greater accuracy in arithmetical calculations.

Pathological changes produced by excessive betel chewing.—We have examined a series of 400 habitual betel chewers in this country and a brief summary of the findings is detailed in the underlying table. All these individuals were taking more than 20 morsels daily.

TABLE

The pathological changes and their relative frequency in habitual indulgers of pan

Pathological conditions	Number of cases	Frequency percentage
1. Caries	120	30.0
2. Deposition of black tartar	218	54.4
3. Recession of gums ..	82	20.5
4. Partial or complete loss of sensibility of the buccal mucosa.	60	15.0
5. Pyorrhœa alveolaris ..	280	70.0
6. Dyspepsia	160	40.0
7. Palpitation	180	45.0
8. Neurosis	35	8.75
9. Giddiness	20	5.0
10. Slow cerebration ..	10	2.5

The figures given above are considerably higher than those occurring among those who do not take betel leaf habitually.

It would appear from this table that excessive indulgence in betel chewing leads to many pathological changes which are deleterious to health. Dental troubles, oral sepsis, dyspepsia, palpitation, neurosis and slow cerebration are only some of the innumerable mischiefs produced by this habit.

Cancer of the mouth.—The excessive use of betel morsel undoubtedly leads to chronic irritation of the lips, mouth and tongue and predisposes to epitheliomatous growths in susceptible individuals. According to Castellani and Chalmers, betel irritation is the commonest cause of cancer of old people in the East. Cancer of the mouth and lips was found to be more frequent in localities where the betel habit was widely prevalent, *e.g.*, Assam, Burma and southern India, than in the northern parts of India where its use was not so popular. Out of 141 cases of cancer among chronic indulgers in *pan* in various hospitals of Bengal, Bihar and Orissa, 18 were cancer of the lips, 3 cancer of the tongue and 120 cancer of the rest of the body. This showed that carcinomatous growths of lips and tongue comprised at least 14 per cent of the total number of cancer cases. Betel-chewing therefore definitely predisposes to carcinomatous growths of the mouth.

Summary and discussion.—The authors have studied the ill-effects of betel-chewing in this country and have examined over one thousand people who were habituated to its use. From the toxicological point of view the objections against its use are less serious than those against alcohol and tobacco. Taken as a whole, the ill-effects of betel are milder than those of narcotics. Dutch observers in the East Indies noticed that it was perfectly harmless in moderate amounts. One or two *pan* morsels a day may stimulate muscular and mental efficiency. The chief objection to its use is that once the habit is formed it is difficult to stop it. From this point of view the consumption of betel must be regarded as an evil. The withdrawal symptoms are a general sense of fatigue and exhaustion, possibly from loss of the stimulation reflex. Unpleasant taste in the mouth and disinclination for exertion are often complained of. According to Ahmed (1928) people who are habitual betel chewers become dyspeptic at about the age of 30 years and suffer from pyorrhœa alveolaris with its attendant sequelæ. He was also of the opinion that cancer of the tongue and cheeks frequently occurs in those who indulge in it excessively. Modi (1928) also made similar observations and found that pyorrhœa was very frequent in these cases but dental caries was not very common. There is dulling of sensibility of the buccal mucous membrane, recession of gums, deposition of lime concretions and atrophy of the alveolar processes.

In our series such effects were observed in excessive consumers and not in moderate and occasional indulgers. Another point, which must not be lost sight of in excessive consumers, is that constant stimulation of salivary secretion involves an enormous waste of saliva which is

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expectorated or swallowed instead of being utilized for digestive purposes. The fibrous portions of betel leaf and betel nut get into the crevices of the teeth and stay there for some time leading to the formation of pockets. This results in irritation of the gums and inflammation of the alveolar margins, and ultimately pyorrhœa alveolaris results. Another point against the use of *pan* is the concomitant use of *zarda* (an aromatic preparation containing tobacco) which is not infrequent. This irritates the buccal mucous membrane, acts on the nerve endings of the teeth, decreases their sensibility and upsets the gastro-intestinal tract.

The consumption of lime with each morsel may lead to excess of lime in the system, with its accompanying effects; lime is excreted in the saliva and is deposited on the teeth in the form of yellow tartar which, if not promptly dealt with, leads to infection of the gum. This deposit may also extend to the roots of the teeth and thus lead to the destruction of the peridental membrane and produce pus pockets. Further, the alkaline juice of the betel morsel is believed to neutralize the gastric acidity and acts as an astringent on the mucous membrane of the stomach. All these effects are observed in excessive chewers and not in moderate and occasional consumers.

REFERENCES

AHMED, R. (1928) .. *Trans. 7th Congress, Far Eastern Assoc. Trop. Med.*, 1927, 1,459. Thacker, Spink and Co., Calcutta.

MODI, J. J. (1928) .. *Ibid.*, 1, 452.

Medical News

ECONOMY IN THE USE OF IPECACUANHA AND EMETINE

AMŒBIC dysentery is common in India and accounts for a fair amount of mortality and morbidity, especially amongst the members of the European communities resident in the tropics. In the treatment of this condition, emetine, one of the principal alkaloids of ipecacuanha, is considered a specific and is very largely used.

Ipecacuanha is not indigenous to India. Attempts have been made to grow this plant in suitable localities in India, but the indigenous supply has never been adequate to meet the local demands. India, therefore, remains largely dependent on foreign sources of supply.

Owing to conditions produced by the War supplies of this essential drug have been scarce and irregular. In the interests of the sick, it is desirable that a general effort on the part of medical men should be made to conserve stocks of this important remedy, so that those who really need it will not be deprived of its valuable curative properties.

The extent to which ipecacuanha enters into popular therapeutics is suprisingly large. Much of this is in the form of Pulvis Ipecacuanhæ et Opii (Dover's powder), which is almost an everyday prescription in influenza, chill, coryza and slight cough. It is often used to 'abort' an attack of cold and also to check mild diarrhœa. Its diaphoretic and astringent actions are mainly responsible for its popularity. Therapeutically there appears to be no particular advantage in using Pulvis Ipecacuanhæ et Opii to bring about these effects. It is the opium in the preparation, and not the ipecacuanha, which brings about the diaphoretic and astringent actions. The astringent action can be very easily obtained, probably more conveniently, by the use of Pulvis Cretæ Aromaticus cum Opio. For diaphoresis, practitioners have at their disposal a large selection of coal-tar remedies including salicylates and their derivatives. The use of Dover's powder can, therefore, be conveniently reduced by encouraging the use of various substitutes which may bring about similar clinical results.

A significant contribution towards economy in the use of ipecacuanha may also be made by exercising a little more judiciousness and care in prescribing the galenicals of ipecacuanha, of which Vinum Ipecacuanhæ (now Tinctura Ipecacuanhæ) is the most widely employed. Tinctura Ipecacuanhæ is a common ingredient of sedative expectorant mixtures frequently seen in the pharmacopœias of various hospitals and out-patients' clinics. Tinctura Ipecacuanhæ is neither a very rapidly acting nor always a trustworthy expectorant. In many types of bronchitis, the use of such mixtures is not of any particular advantage and Tinctura Ipecacuanhæ may be replaced by Vinum Antimoniale or Tinctura Scillæ. Only in pediatric practice is there some justification for its continued use in war-time.

Pulvis Ipecacuanhæ is gradually going out of fashion but prescriptions are still seen where this has been used either for its emetic or for its cholagogue action. Such uses are a relic of the old days and cannot be supported by rational therapeutics. Ipecacuanha has now been shown to be a poor emetic and its supposed cholagogue action is also doubted by modern pharmacological investigators. Its use in such conditions therefore need no longer be advocated.

Whatever may have been the justification of such haphazard use of ipecacuanha in pre-war days, it is the clear duty of all medical men to stop such practice in these abnormal times when there is a shortage of this essential remedy. If every medical man employs the same rigid criterion in the use of ipecacuanha as they do in the diagnosis of their cases, much waste in the use of the preparations and galenicals of ipecacuanha could be avoided and stocks of ipecacuanha could be reserved for the extraction of emetine, whose value in the treatment of amœbiasis has been fully established.

MEDICAL RESEARCH IN INDIA, 1911 to 1941

THE establishment of the Indian Research Fund Association in 1911, with the object of prosecuting research into medical problems and experimental work generally in connection with the causation, mode and prevention of disease, was an important event in the history of medical research in this country, states the Public Health Commissioner's report for 1940. The Association has, in the succeeding period of thirty years, fostered research into diverse medical problems, has provided, through its advisory committees on different subjects such as nutrition, malaria, cholera, maternal mortality, tuberculosis, plague and leprosy, expert guidance to health administrations in their day-to-day problems and has, above all, helped to raise a body of workers in the different branches of medical research whose services will continue to be available to the country in the future.

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PAY OF ASSISTANT SURGEONS OF THE EMERGENCY BRANCH OF THE I.M.D. (INDIAN CADRE)

IN accordance with one of the recommendations of the I.M.D. Recruitment Conference held in Simla on 23rd September, 1941, the Government of India are pleased to announce that the emoluments of Assistant Surgeons of the Emergency Branch of the I.M.D. (Indian Cadre) will be raised as from 1st December, 1941. The pay will be as heretofore, namely Rs. 75 to Rs. 175, but the former Civil Allowance of Rs. 50 will be replaced by an Emergency Allowance of Rs. 125 p.m. Thus, the initial pay plus emergency allowance will now total Rs. 200 p.m. instead of Rs. 125 as before.

I.M.S. PERMANENT COMMISSIONS. WAR SERVICE PREFERENCE

OFFICERS holding King's and Indian Emergency Commissions in the Indian Medical Service during the present emergency will be given preference when permanent appointments are made after the war, provided they are qualified under the conditions then in force.

I.M.S. EMERGENCY COMMISSIONS. ADVANCE OF PAY FOR SELECTED CANDIDATES

THE Government of India have decided that candidates selected for Emergency Indian Commissions in the Indian Medical Service will be allowed to draw advance of pay at the time of appointment, not exceeding Rs. 300 if the candidate has been selected in India and equal to two months pay if in the United Kingdom.

The advance will be recovered from the officer's pay at the rate of one-third of his pay.

MALARIA

MALARIA is easily the largest public health problem in India. The deaths from this disease number about a million and a quarter every year while the number of attacks may be as high as 100 millions.

The Malaria Institute of India, which is maintained by the Government of India, is an institution which co-ordinates to a large extent the anti-malarial operations conducted by the Central and Provincial Governments. In Delhi, within the last five years, a very successful anti-malaria campaign has been in operation, including the provision of certain permanent engineering works costing Rs. 17,00,000. The incidence of the disease has been reduced to negligible proportions and the mosquito nuisance has been almost eliminated.

A research unit of the institute has completed two years' observation in the Terai area in the United Provinces and the data collected are being analyzed. In Wynaad taluk of Madras Presidency and in the vicinity of the Chilka Lake in Orissa, studies regarding the factors responsible for the prevalence of malaria have been in progress and valuable information has already been collected for instituting preventive campaigns.

ANTI-MALARIA UNITS

IN consultation with the military authorities six anti-malaria units have been raised for the investigation of local malaria conditions in the war area. A detailed study is essential for the planning of proper measures of control in these areas.

The duties of the units include the identification of mosquitoes, the incrimination of the local malaria carriers by dissection, the study of their bionomics, the study of malaria among the local inhabitants by spleen and blood examinations, the determination of the species of malaria parasite locally present and of the period of the year during which malaria transmission takes place.

Four emergency courses in malaria have been held at the Malaria Institute of India, Delhi, for training military personnel in anti-malarial methods.

STATE SUBJECTS ELIGIBLE FOR AUXILIARY NURSING SERVICE

IT is notified that subjects of Indian States volunteering for 'general service' are equally eligible with subjects of British India for admission to the Auxiliary Nursing Service. Several hospitals located in Indian States have already been recognized as approved hospitals for Auxiliary Nursing Service training and the Director-General, Indian Medical Service, is prepared to consider the recognition of other well-equipped hospitals in Indian States which are staffed for the training of nurses.

In regard to 'local service' under the Defence Department, a limited number of State subjects may be accepted in the service from the few selected stations where such local nursing assistance is required in military hospitals.

The award of Auxiliary Nursing Service scholarships for the training of Indian State subjects for 'local service' under A.R.P. schemes is being considered.

THE INDIAN HONOURS LIST

1ST JANUARY, 1942

THE following are the names of medical men, and others associated with medical institutions, in the Indian Honours List of date 1st January, 1942. We offer them our congratulations.

Knighthood

R. D. Dalal, Esq., C.I.E., Member of the Central Legislative Assembly.

C.I.E.

Lieutenant-Colonel M. G. Bhandari, I.M.S., Inspector-General of Prisons, Bombay.

Lieutenant-Colonel W. E. R. Dimond, I.M.S., lately officiating Inspector-General of Civil Hospitals, North-West Frontier Province.

Lieutenant-Colonel M. M. Cruickshank, I.M.S., Chief Medical Officer and Civil Surgeon, Delhi, and lately Superintendent, Government General Hospital, Madras.

Lieutenant-Colonel R. Hay, I.M.S., Deputy Director-General, Indian Medical Service.

Lieutenant-Colonel A. H. Harty, I.M.S., Civil Surgeon and Superintendent, B. J. Medical School, and Superintendent, Mental Hospital, Ahmedabad, Bombay.

O.B.E. (Civil Division)

Major G. S. Gill, I.M.S., Inspector-General of Prisons, Madras.

M.B.E. (Civil Division)

P. V. Cheriyan, Esq., Surgeon in charge of Ear, Nose and Throat Department, Government General Hospital, Madras.

Captain C. J. Hassett, I.M.S., Agency Surgeon, North Waziristan, and Medical Officer, Tochi Scouts, North-West Frontier Province.

A. X. Pereira, Esq., Resident Medical Officer, Civil Hospital, Karachi, Sind.

Rao Bahadur T. A. P. R. Pillai, Medical Practitioner, Coimbatore, Madras.

J. M. Rakshit, Esq., Chief Medical Officer, Tata Iron and Steel Company, Jamshedpur, Bihar.

Khan Bahadur N. J. Vazifdar, General Secretary, Bombay Provincial Branch, Indian Red Cross Society, Bombay.

Kaisar-i-Hind Gold Medal

Miss Anna Pollock Martin, Doctor-in-Charge, Mure Memorial Hospital, Nagpur, Central Provinces and Berar.

Miss Louisa Mary Poynder, Medical Practitioner, Simla.

Miss Constance Wilson, Chief Lady Superintendent, Lady Minto's Indian Nursing Association.

Kaisar-i-Hind Silver Medal

Mrs. Edith Breithaupt, Matron, Lady Reading Hospital, Peshawar, North-West Frontier Province.

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Miss Lilavati Sakhawatrai Chablani, Lady Superintendent-in-Charge, Maternity Home, Sukkur Municipality, Sind.

Miss Loal Electa Huffman, Lady Doctor in charge of Butler Memorial Hospital, Baroda.

Miss Vera Constance Victoria Studd, Nursing Superintendent, Zenana Mission Hospital, Tank, North-West Frontier Province.

Sister Doris Miller Timmins, Matron of the Baptist Mission Hospital, Chandraghona (Chittagong Hill Tracts), Bengal.

Mrs. Putlibai Rustomji Vakil, Medical Officer, King Edward Memorial Hospital, Poona, Bombay.

M. V. Apte, Esq., Medical Practitioner, Bagalkot, Bijapur District, Bombay.

The Reverend J. H. W. Schultz, Superintendent, Chandkhuri Leper Home and Hospital, Baitalpur, Drug District, Central Provinces and Berar.

L. M. Sen, Esq., Chief Sanitary Officer, Asansol Mines Board of Health, Bengal.

Kaisar-i-Hind Bronze Medal

Miss Chandra Keshab, Lady Sub-Assistant Surgeon in Medical charge, Sir Bindon Blood Indian Family Hospital, Roorkee.

Miss Cherry Florence Massey, Lady Sub-Assistant in charge, Peshawar Indian Troops Zenana Hospital.

B. C. Bose, Esq., District Health Officer, Chittagong, Bengal.

Diwan Bahadur

Rao Bahadur A. L. Mudaliyar, Principal, Medical College, and Superintendent, Government Hospital for Women and Children, Madras.

A. N. Nanda, Esq., Medical Practitioner, London.

Khan Bahadur

M. A. Allam Sahib Bahadur, Personal Assistant to the Surgeon-General with the Government of Madras.

Rai Bahadur

Rai Sahib K. P. Mitra, Civil Surgeon, Muzaffarpur, Bihar.

Rai Sahib S. C. Ghosh, Director, Civil Veterinary Department, Assam.

Rao Bahadur

Rao Sahib Y. P. Vasudevan, District Health Officer, Coimbatore, Madras.

R. K. Mhatre, Esq., Executive Health Officer (Retired), Bombay Municipality, and Assistant Director (Officiating) of Public Health, Bombay.

Shifa-ul-Mulk

Hakeem M. A. Moid, Member, Board of Indian Medicine, Lucknow, United Provinces.

Hakim S. M. Ahmad, Senior Professor, Government Tibbia School, Patna, Bihar.

Vaidyaratna

Pandit P. Vaid in charge of the Municipal Ayurvedic Dispensary, Ballimaran, Delhi.

Sardar Sahib

Y. Singh, Esq., Medical Officer in charge, Victoria Hospital, Darjeeling, Bengal.

Bhai A. S. Chawla, Sub-Assistant Surgeon in charge, Civil Hospital, Daska, Sialkot District, Punjab.

Khan Sahib

A. Ahmad, Esq., Medical Practitioner, Dacca, Bengal.

K. Ahmad, Esq., Assistant to the Civil Surgeon, Lucknow, United Provinces.

Hakim M. B. Qadri, Unani Physician, Siwan, Saran, Bihar.

A. A. M. Z. Abbasi, Esq., District Medical Officer, Dadu, Sind.

Jemadar B. Ali, I.M.D., Assistant Surgeon, Legation Hospital, Kabul.

Rai Sahib

N. C. Shome, Esq., Medical Officer in charge, Ursula Horsman Hospital, Cawnpore, United Provinces.

B. Gopal, Esq., Assistant Hygiene Publicity Officer, United Provinces.

B. Roy, Esq., Second Medical Officer, Sadar Hospital, Ranchi, Bihar.

Rao Sahib

B. Misra, Esq., Health Officer, Cuttack Municipality, Orissa.

Subdr.-Major T. V. D. Naidu, I.M.D., Sub-Assistant Surgeon, Port Blair.

O.B.I.

To the First Class with the title of 'Sardar Bahadur'
Indian Medical Department

Subdr. Kishan Singh Bahadur.

Subdr.-Major and Honorary Lieutenant Rai Sahib Bashi Ram Bahadur.

Subdr.-Major Chajju Singh Bahadur.

Subdr.-Major and Honorary Lieutenant V. K. Nasir-ud-din Bahadur.

Subdr. Raj Singh Bahadur.

To the Second Class with the title of 'Bahadur'
Indian Medical Department

Subdr. (Honorary Subdr.-Major) Amar Nath Puri.

Subdr.-Major and Honorary Captain Gurdit Singh, M.B.E.

Subdr. Ram Datta Kumar.

Subdr.-Major and Honorary Lieutenant Aswini Kumar Sarkar.

Subdr. Wadhawa Singh.

Subdr. Ganga Singh.

Subdr. Muhammad Hasan.

Subdr. Basant Singh.

A/Subdr.-Major T. B. Karumbayram.

A/Subdr.-Major Sakharam Sonu Parab.

Subdr. Bhag Singh.

A/Subdr.-Major Hari Singh.

Jemdr. Hanmant Dattatrya Bedekar.

A/Subdr.-Major Bansi Ram Sharma.

Subdr. Abdulmia Ahmedmia Bukhari.

A/Subdr.-Major Milkha Singh Dhindsa.

Jemdr. Bhai Kartar Singh.

MEDICAL TECHNICIANS FOR MILITARY HOSPITALS

WITH a view to economising in the use of qualified doctors required by the Army in the present emergency, the Government of India have decided to recruit technicians for employment on routine medical duties in military hospitals.

These men will be employed as compounders, radiographers, and laboratory assistants and will be enrolled as Warrant Officers, Class II, in the Indian Medical Department. They will relieve a large number of doctors who will be utilized in other spheres requiring expert knowledge.

The men to be recruited for this service will be required to have passed the matriculation or an equivalent examination of a recognized Indian university. Preference will be given to those possessing previous training and experience in their special subjects.

Men already in Government service who wish to volunteer will be eligible for this service. They will be given an extra 25 per cent of their pay as compensatory allowance while serving in India and 50 per cent if called upon to serve overseas.

GERMAN INFANTILE MORTALITY

THE death rate of German babies last year was still much higher than the infant mortality rate in England, comparing the figures for 126 English large towns with German towns having a population of over 100,000.

The latter statistics, from the Reich's *Journal of Public Health*, which have now become available, give an infantile mortality rate during 1940 of 63 per 1,000 as against the English rate of 51. The German rate is the highest for the last four years, for each of which it has been at least 10 per 1,000 higher than the English rate. In no one year since the Nazis bluffed their way to power has the number of the 'Herrenvolk's' surviving infants approached the English total.

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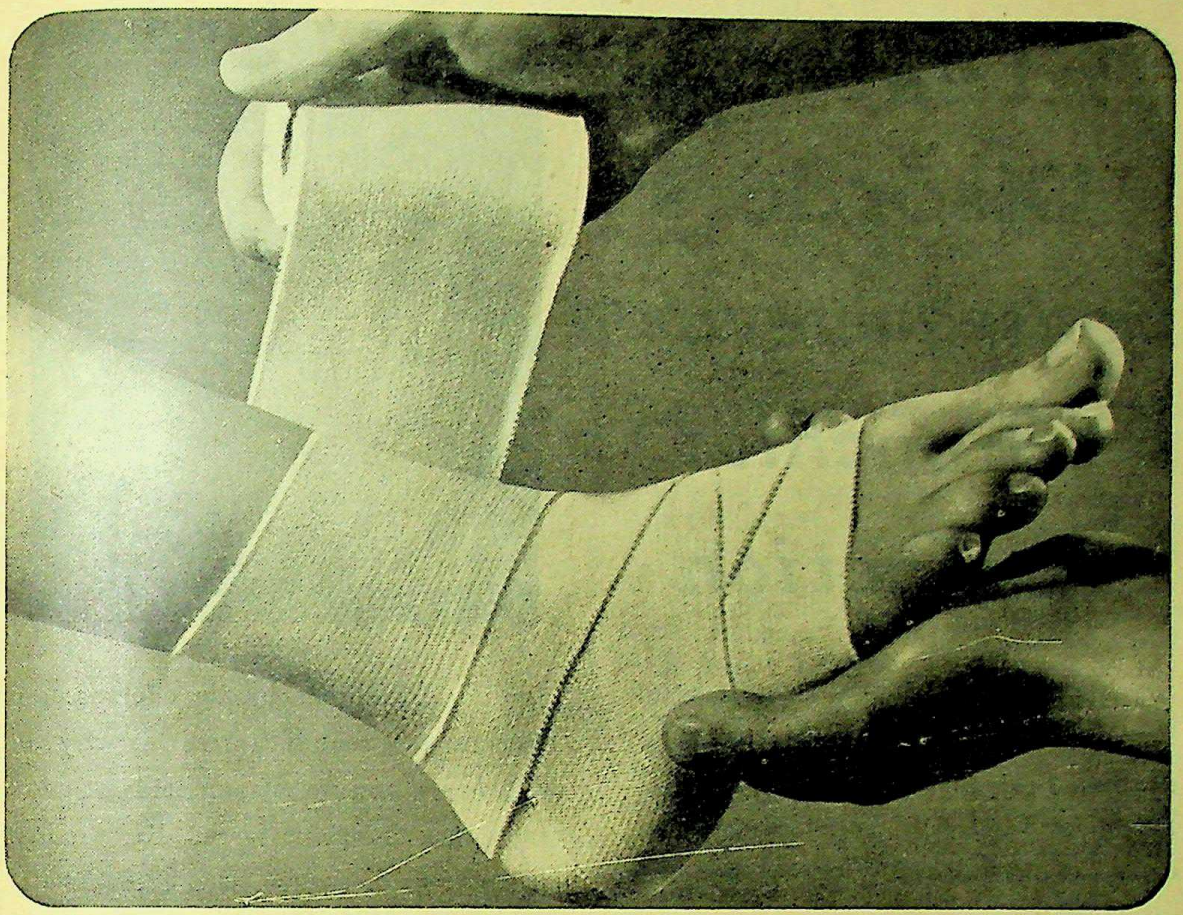

'Elastoplast' in the treatment of Sprains

PAIN is relieved, swelling controlled and hæmatoma formation prevented by the use of an 'Elastoplast' Bandage applied over the joint, muscle or ligament.

Early application permits the patient to use the injured part and shortens the period of incapacity.

The bandage should extend for several inches above and below the affected part; for example, in sprains of the ankle joint, it should commence at the base of the toes and finish at the upper part of the calf.

The tension of the bandage must be considerable—a loosely applied bandage fails to relieve symptoms.

In the 'Elastoplast' Bandage the combination of the particular adhesive spread, with the remarkable *stretch* and *regain* properties of the 'Elastoplast' cloth, provides the exact degree of compression and grip.

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AS SUPPLIED TO THE GOVERNMENT OF INDIA

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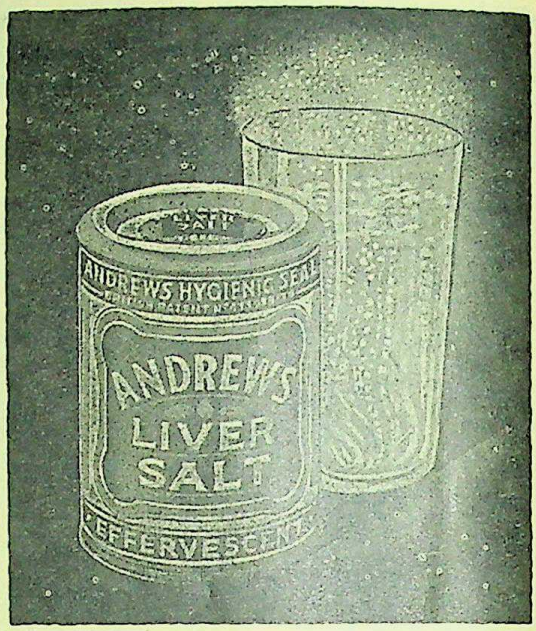
Intestinal Disorders

Consequent upon Bronchial Infection



PARTLY owing to the considerable amount of sputum inevitably swallowed by the patient in bronchial affections (especially in children) disorders of the digestive organs may be produced.

A suitable diet and a free daily evacuation tend to prevent these disorders.

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Handy size	..	..	.. **As. 12**
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Public Health Section

HEALTH LEAGUES IN INDIAN VILLAGES

THE Public Health Commissioner's annual report for 1940 draws attention to the increasing interest that Provincial Governments have been taking in the welfare of the rural population. It is pointed out that, in a number of provinces, studies in the organization of a rural health service have been in progress through the formation of health units, that the question of improving and extending water supplies in the rural areas has received attention and that the provision of a cheap but satisfactory system of night-soil disposal has also been under investigation. A health unit is an organization set up in an area with a population of approximately 40,000 for the purpose of studying the methods of developing a rural health service. The staff usually consists of a medical officer of health, an assistant medical officer, proferably a woman, four sanitary inspectors, four health visitors, eight midwives, one clerk and the necessary menials. An encouraging feature of the health unit system has been the development of health leagues in villages. Health units were working during 1940 in the provinces of Madras, Bombay, Delhi, Bengal and the United Provinces. The Rockefeller Foundation has made substantial grants to these health units and has also helped their working with the technical advice of different members of its staff resident in India.

Work of health leagues

Dr. W. P. Jacocks, Regional Director in India and Ceylon of the International Health Division of the Rockefeller Foundation, states that the entire village population constitutes the league membership, and at meetings any member of the village community is free to offer suggestions or to discuss proposals.

'The usual procedure is to form a small committee consisting of a chairman, a secretary and three or more members of the village. This committee meets monthly and records its deliberations in a minute book. A member of the health unit staff attends the committee by invitation and gives the committee the benefit of his technical knowledge. As a result, at one of the early gatherings a programme is prepared containing various items of work to be attempted and the order in which they are to be taken up. These details include clean-up days by sweeping and by removing the cattle to the borders of the village, vaccination against smallpox and other diseases, putting ventilators and windows in homes, digging bore-hole soakage pits and bore-hole latrines, collecting vital statistics, and attending to other similar village needs'.

Famine relief

In the past, famine relief consisted mainly of providing work for the people of the affected areas and of paying them wages with which to purchase food. The physiological aspects of nutrition were not recognized and no provision was made to ensure that, under the conditions of physical strain that accompany famine, the nutrition of the people was kept at a sufficiently high level to ward off disease.

The advantage of active co-operation between the health authorities and the officials carrying out famine relief measures has been fully demonstrated during the past few years in the famine-stricken areas of the Hissar district in the Punjab and in Ajmer-Merwara. In Hissar all preventive and curative work was carried out in a co-ordinated manner and the measures taken included: (1) reduction of the task of workers to the extent of 50 per cent, (2) the location of new works in such places as would reduce the distance that the labourers had to walk, (3) the division of the whole area into 50 health circles, each consisting of villages within a radius of five miles, and the organization of special treatment centres with a medical officer in charge of each circle, and (4) distribution of germinated grain and *amla* (Indian gooseberry) to make up food deficiencies.

The value of the measures can be assessed from the fact that, within a few weeks of the administration of germinated grain and *amla*, conditions due to food deficiencies, such as scurvy and night blindness, altogether disappeared from the famine-stricken population. The Director of Public Health, Punjab, points out that the cost of these measures was only one-tenth of an anna per head of the population per week.

In Ajmer-Merwara, the experience gained in Hissar was utilized and germinated grain was distributed among the population before deficiency diseases made their appearance. It is stated that no case of scurvy occurred among the people and that the growth and the general health of the children did not materially suffer.

Services of labourers

The Public Health Commissioner makes some interesting remarks regarding the utilization of the services of the labour population in famine areas for work of such a nature as will prove to be of permanent value to the village community. He says, 'such measures as improvement of water supply, development of rural communications and planting of trees may, with advantage, be carried out. In a malaria-stricken area much of the earth-work associated

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with anti-mosquito measures can be carried out. The sanitation of the village site is another important direction in which the services of the people can be usefully employed. By directing the energies of the people into such useful channels it may be expected that the improvements effected will leave a lasting impression on their minds and that the development of co-operative effort among the people for the betterment of their own health will be promoted'.

Health of school children

The children of to-day are the citizens of to-morrow. The medical care of school children includes their periodical examination by competent doctors, the treatment of the defects discovered during such examinations, provision for under-nourished children of such food as may be necessary to raise them to an average standard of health and the inculcation of hygienic habits through example and precept by their teachers and the school medical staff.

School medical service

The school medical service has not been organized in this country on the same generous lines as in more progressive countries in the West. The Public Health Commissioner's report draws attention to what is being done in New Delhi to improve the health of school children.

In New Delhi the school medical service was in its fourth year of existence in 1940. The Chief Health Officer, Delhi Province, points out that during the year there was an appreciable diminution in the percentage of children with defects requiring treatment and that there was reason to believe that the medical care devoted to these children during the previous three years has begun to exert a beneficent influence on the general health of the children.

The principal defects noted were malnutrition, dental trouble and defective vision. The extent of dental trouble prevalent among school children may be judged from the fact that during the year the school dentist carried out 474 extractions, 406 fillings, 93 nerve treatments and 74 cleanings of tartar deposits. In addition, treatment was given for 39 cases of gingivitis and 17 cases of calcium deficiency. The numbers of boys and girls discovered during the medical examination to have errors of refraction were 259 and 244 respectively.

During the year, the Central Advisory Board of Health considered the dual question of the teaching of hygiene in schools and of the medical inspection of school children. The question is now being dealt with by a joint committee of the Central Advisory Board of Health and and the Central Advisory Board of Education.

THE RÔLE OF PROTOZOA IN THE ACTIVATED SLUDGE PROCESS

By S. C. PILLAI, B.A., A.I.I.SC.
Department of Biochemistry, Indian Institute of Science, Bangalore

THE efficiency of the activated sludge process depends on the formation of the active clot which forms the nucleus of sludge formation and thus facilitates the removal of solid putrescible organic matter. The mechanism of the formation of this clot has been studied by a number of workers commencing with Fowler and his associates in 1913. In fact work on flocculation of colloidal matter in sewage began some years prior to the activated sludge researches which date from the work of Fowler and Mumford on the bacterial clarification of sewage employing a new iron bacterium, 'M_7'. Quite recently Heukelekian (1941) has reviewed the present state of our knowledge of mechanical flocculation and bioflocculation of sewage, and concluded that the flocculation is brought about both by physical and biological agencies working either independently or simultaneously. Mechanical flocculation plays a more important part during short periods; as the period is increased, bioflocculation plays an increasingly important rôle. It would appear from his account that, on the biological side, the protozoa are not recognized as an important factor in the clarification and flocculation of sewage.

Fowler's observations (1916, 1922) suggested that the activated sludge process 'can be referred entirely to bacterial activity', the ideal being to produce a mass of active bacteria of the desired type, which would then function under the best possible conditions. Ardern and Lockett (1914) observed that the protozoan content of the tank 'rather indicate a particular condition of the activated sludge that play an important part in the changes effected'. Harris *et al.* (1920) adduced evidence that the presence or absence of protozoa neither increases nor detracts from the efficiency of fully matured activated sludge, and that the significance of their presence and the value attached to the identification of the prevailing forms lie rather in the information thereby afforded as to the condition of the sludge, and the timely warning given of the onset of unhealthy and undesirable developments. Fairbrother and Renshaw (1922), however, considered the presence of protozoa harmful to the process of purification, and even recommended that they might be killed off by the selective action of the oxazine group of dyes. The earlier evidence would thus suggest that floc production in the activated sludge tank is predominantly due to a nucleus of aerobic bacteria which multiply under the conditions of the tank and, at the same time, act as a kind of sieve for removing the suspended organic matter.

It was however recognized that the 'non-bacterial population' together with the

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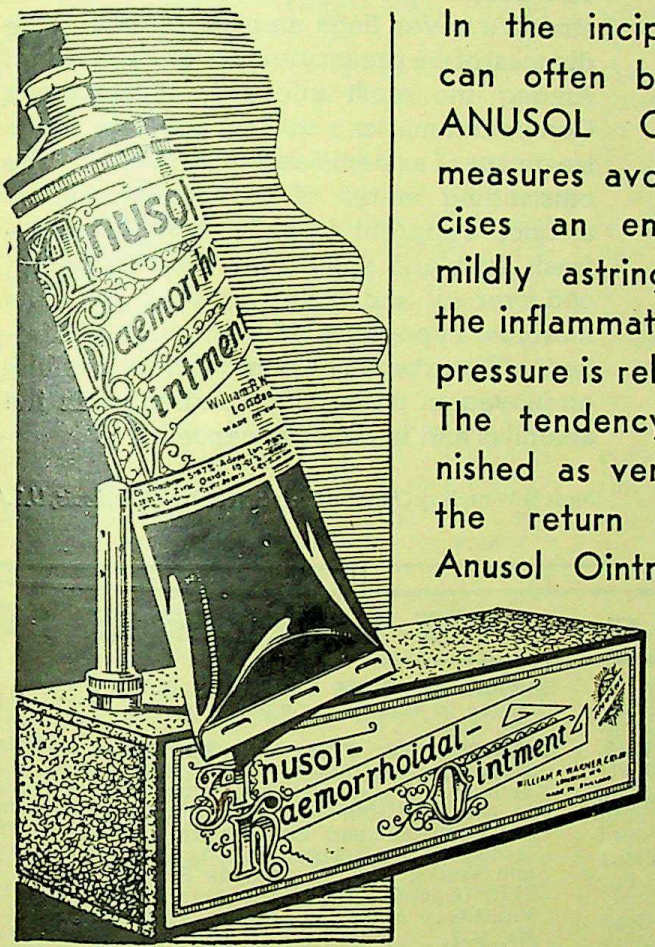
The Safe Treatment of HAEMORRHOIDS



In the incipient stages, haemorrhoids can often be treated successfully with ANUSOL OINTMENT, and surgical measures avoided. The ointment exercises an emollient, decongestive and mildly astringent action. By reducing the inflammation that causes congestion, pressure is relieved and pain disappears. The tendency to bleeding is also diminished as venous stasis is relieved and the return circulation is improved. Anusol Ointment may safely be prescribed for young or old without fear of rectal absorption of any toxic substance. No narcotic, analgesic or anaesthetic drug enters into the composition of the ointment.

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flocculated colloids account for the high nitrogen content of activated sludge (Ardern, 1920). The experiments carried out by Richards and Sawyer (1922) indicated that protozoa, in the numbers which were actively found in Harpenden activated sludge, might easily contain at least half the extra nitrogen beyond that found in simple sedimented sewage solids. The latter workers further observed that the increase in bacterial numbers, consequent on suppression of the protozoa by the partial sterilization, produced no improvement in purification of sewage and that both carbon and nitrogen oxidations were seriously retarded. Swaminathan (1929) confirmed the latter observation that, although inhibition of the protozoa resulted in an increase in the bacterial population, nitrification did not take place more rapidly.

Buswell and Long (1920-1922) described activated sludge flocs as composed of a synthetic gelatinous matrix, in which filamentous and unicellular bacteria are embedded and on which various protozoa and some metazoa crawl and feed, and contended that the purification is accomplished by ingestion and assimilation of the organic matter in the sewage by organisms and its re-synthesis by them into the living material of the floc, though no proof of this statement was given. Cramer (1931) concluded from his experiments that a vigorous and healthy protozoan life should be maintained in the sludge, and suggested that a daily microscopic examination of sludge would soon be recognized as the most effective means of controlling conditions in the activated sludge process. At the same time the protozoa help to synthesize the organic matter which would otherwise remain in a colloidal non-stable state, then when they reach a certain stage of development die and disintegrate and thus afford further food for the bacteria. More recently Butterfield *et al.* (1937) have reported that a certain amount of clotting could be obtained with some of the bacteria present in the sewage and, although they have emphasized the primary importance of bacteria in the activated sludge process of purification, they have admitted that there may be several other organisms which are equally or possibly even more potent in forming the sludge. Viehl (1937) found that the oxidation of dissolved organic matter is carried on by bacteria alone but the flocculation and adsorption of colloids are dependent on the presence of protozoa in general and ciliates in particular.

Independent of the above studies, there has been growing a considerable volume of literature on the occurrence and distribution of protozoa in the activated sludge tank. Even the earliest workers with activated sludge called attention to the great number of protozoa that were always present (Ardern and Lockett, 1914). The presence especially of certain forms of protozoa in a vigorous state of activity has been found to be a characteristic of 'healthy' sludge containing a high percentage of nitrogen. Conversely, it has been observed that as the protozoa either diminish in numbers or become encysted for some reason or other, the whole process of purification is adversely affected.

Although the foregoing observations suggest that the protozoa probably play a rôle in the process of purification, yet very little work has been done with a view to elucidating their direct part in the process. This may be largely traced to the general impression that the protozoa destroy bacteria and consequently in some way interfere with the normal functioning of the important aerobic bacteria. How far this actually occurs is still not proved. In fact, Nasir (1923) and Cutler and Bal (1926) found that the presence of a protozoon actually increased the amount of nitrogen fixed by *Azotobacter chroococcum,* although their numbers were decreased.

Recently the present author (1938) was placed in control of the putting into operation of the new activated sludge installation at Cossipore, Calcutta. This is perhaps the largest plant in India on the 'complete' or pioneer activated sludge process, *i.e.,* without preliminary settlement of sludge. He then observed that building up of sludge in the aeration tanks proceeded simultaneously with the appearance and development of certain forms of protozoa, especially the species of *Vorticella.* Further comparative studies (Pillai, 1941) carried out with cultures of this and other species of protozoa by inoculating them in different ways into raw and sterilized sewage and by bubbling air through the suspensions clearly showed that they are, as a group, much more efficient in floc formation than any of the bacteria tried singly or in combination. Among the protozoa studied, the species of vorticellidæ and epistylidæ gave much the best results. It was observed that the sewage after a few hours' treatment with these forms of protozoa, when allowed to settle, yielded a supernatant which showed (*a*) considerable decrease in suspended matter and colloids, (*b*) considerable decrease in the free and saline ammonia as also in albuminoid ammonia, and (*c*) rapid nitrification. Nitrate formation was found to take place much earlier. It was also observed that the resultant sludge contained more nitrogen than that from the bacterial series.

The protozoa have therefore important functions to perform in activated sludge. Both by their physical structure and through the formation of a slimy mass, the protozoal colonies appear to behave like minute pieces of sponge. These flocculi, offering a very large surface area for contact, absorb the suspended organic matter and ammonia of the sewage during the process of aeration which provides the necessary agitation, and thus promotes the conditions necessary for nitrification. The increased nitrogen content of the sludge from the protozoa series may be due to the protein of the cells of protozoa, which holds up a considerable part of

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the nitrogen originally gained from the sewage. Thus the rôle of protozoa in the activated sludge process is at least threefold : they bring about efficient flocculation, rapid nitrification, and considerable nitrogen conservation.

The author thanks Professor V. Subrahmanyan for the great interest he has taken in the work and for his encouragement. His thanks are also due to Dr. Gilbert J. Fowler for having given him an opportunity to study the conditions in a new activated sludge plant.

REFERENCES

ARDERN, E. (1920) .. *J. Soc. Chem. Industry*, **39**, 60T.

ARDERN, E., and LOCKETT, W. T. (1914). *Ibid.*, **33**, 523.

BUSWELL, A. M., and LONG, H. L. (1920–22). *Illinois State Water Survey Bull.*, No. **18**.

BUTTERFIELD, C. T., *et al.* (1937). *Pub. Health Rep.*, **52**, 387.

CRAMER, R. (1931) .. *Industrial and Eng. Chem.*, **23**, 309.

CUTLER, D. W., and BAL, D. V. (1926). *Ann. App. Biol.*, **18**, 516.

FAIRBROTHER, T. H., and RENSHAW, A. (1922). *J. Soc. Chem. Industry*, **41**, 134T.

FOWLER, G. J. (1916) .. *J. Inst. Sanit. Eng.*, **20**, 29, 39.

Idem (1922) .. *J. Soc. Chem. Industry*, **41**, 72T.

FOWLER, G. J., and MUMFORD, E. M. (1913). *J. Roy. San. Inst.*, **34**, 497.

HARRIS, E. W., *et al.* (1920). *Report on Glasgow Works, Corporation of Glasgow.*

HEUKELEKIAN, H. (1941). *Sewage Works J.*, **13**, 506.

NASIR, S. A. (1923) .. *Ann. App. Biol.*, **10**, 122.

PILLAI, S. C. (1938) .. *Report on the Cossipore Plant to* Dr. G. J. Fowler, Representative of Messrs. Activated Sludge Ltd., London.

Idem (1941) .. *Current Sci.*, **10**, 84.

RICHARDS, E. H., and SAWYER, G. C. (1922). *J. Soc. Chem. Industry*, **41**, 62T.

SWAMINATHAN, N. (1929). *J. Indian Inst. Sci.*, **12A**, 131.

VIEHL, K. (1937) .. *Zeitschr. Hyg. u. Infektionskr.*, **119**, 383.

Current Topics

Chemotherapy in Acute Otitis Media

(From the *British Medical Journal*, Vol. II, 5th July, 1941, p. 20)

HARVEY CUSHING once pointed out that progress in medicine occurs mostly by fission, and that special departments and groups, once they are strong enough to be independent, seldom fuse either with one another or with the parent body. He revealed a proposal for the creation at Johns Hopkins University, on the resignation of Osler, of a *super*-professorship of medicine to keep all the departments in contact and in proper relationship with one another. The scheme never matured because W. H. Welch, who was asked to undertake the task, refused; but it is not difficult to see what influence the holder of such a position might exercise. One matter that would certainly occupy his attention to-day would be the control of acute bacterial infections by chemotherapy. Every clinical department, both general and special, has turned eagerly to the new resources. Enthusiasm and sometimes lack of judgment have been manifested, so that the abuse of chemotherapy has become as important a subject for inquiry as its use. A speaker in a recent debate named the quantity of the new drugs which had been dispensed in one year in a large hospital in London, and the figure was so large that it is impossible to avoid the conclusion that a respectable fraction must have been misapplied. This is probably the state of affairs in many other hospitals. The early and most spectacular successes with chemotherapy were in cases of septicæmia, mostly obstetrical in origin; but such cases are sometimes otogenic, and aural surgeons soon found that not only septicæmia but also meningitis could be controlled, and that recovery could become commonplace in cases which a few years ago would certainly have been fatal. Recovery, however, if no longer a miracle, is still not the end of every case. Why should there be failures? How and to what extent should chemotherapy be used in those early infections where complications have not yet arisen and the trouble is likely to be self-limiting?

The answer to the first question is twofold. It is necessary to be certain that the infecting organism, both in the primary focus and in the area to which the complication has extended, is one which may be expected to yield to the treatment. Clinical examination, however careful and frequent, is nowadays not enough. Bacteriological examination is essential so that the appropriate drug, if there be one available, may be administered. Generally sulphanilamide is chosen, but in a pneumococcal infection it may be necessary to change to sulphapyridine or sulphathiazole. Secondly, the treatment cannot succeed in the presence of a collection of undrained pus or if there is an infected thrombus anywhere in the area concerned. It is no use demanding the impossible of these drugs, and to employ them in such circumstances only brings discredit on a potent remedy; for either the patient will die unrelieved or there will be a temporary but only apparent clinical improvement which masks the real state of affairs. In the latter case the complication will ultimately prove fatal, even if it seems to disappear, as in the case of meningitis, for it will be fed afresh from the primary focus of suppuration if this is not eliminated. The treatment required may vary from a simple paracentesis of the tympanum to an extensive mastoid operation. If there is a venous thrombosis the clot need not, in theory, be disturbed so long as it is aseptic; but how often this occurs may be guessed from the usual clinical history of such cases. In practice it should be removed until there is free bleeding from each end of the opened sinus. If it extends downwards out of reach to the jugular bulb there should be no hesitation in tying and dividing the jugular vein in the neck, so that the bulb can drain when the ligature is removed from the upper end of the vein. It seems remarkable—even taking for granted the potent effect of the appropriate drug on each organism—that in purulent streptococcal or pneumococcal meningitis so many recoveries ensue, for the ease with which a collection of pus may become entangled in the meshes of the arachnoid must be a severe handicap upon the action of the drug. It may be, therefore, that a basal meningitis, on account of the size of the cisterns, is more prone to resolution than a meningo-cortical extension, which would easily become encysted and localized into an abscess. For this reason a very high percentage of recoveries from meningitis can be expected only when the treatment is administered at an early stage.

Chemotherapy has proved its worth under desperate conditions. The next question is, how and to what extent it should be used in early infections that are likely to be self-limiting and which might recover spontaneously or with simple, old-fashioned treatment? Once an acute infection of the middle ear has been

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initiated it is impossible to predict what its course may be. It is therefore wholly reasonable to adopt a treatment that may shorten its duration and, by promoting early resolution of the inflammation, give protection against complications. That chemotherapy can do this is not merely a general clinical impression; the figures of Horan and French give satisfactory proof. In a series of 607 cases from 1934 to 1937 there were 138, or 22.7 per cent, needing the mastoid operation. In 621 cases treated by chemotherapy from 1937 to 1939 only 21, or 3.4 per cent, required operation; there were no deaths in the second series. Wesley Bowers has produced similar evidence. In a series of 793 cases, 396 were treated by chemotherapy. He found that both the duration of the discharge and the proportion of patients needing mastoid operation were reduced in this way by 50 per cent.

The statistics of Horan and French present two convincing features. The numbers of the control series and the experimental series are nearly the same, and the clinical material is of a homogeneous character, being drawn from the personnel of the Royal Navy. Not only is the number of mastoid operations materially reduced, but the absence of any fatality is strong evidence of protection against complications. There is, therefore, justification from the evidence (supported by the observation of Wesley Bowers) for administering either sulphanilamide or sulphapyridine in acute otitis media. But this is not to be done in a casual manner, for although the administration is an exceedingly simple matter it is not without some risk. Here again it is necessary to know the nature of the infecting organism if it is to be made certain that an appropriate drug is available for administration. It is no excuse to plead that because the tympanic membrane has neither ruptured nor been incised there is no discharge to examine. The infection comes from the nasopharynx, and material taken from there will give the bacteriological diagnosis. In any case discharge collected from the meatus is liable to be contaminated from the skin.

In all statistics the majority of infections are shown to be streptococcal, though the pneumococcus is nevertheless frequently found. T. B. Layton has divided the infections of the middle ear into the nasopharyngeal and the cutaneous—the former travelling by the Eustachian tube and the latter reaching the tympanum from the skin of the meatus through a perforation. This assumes that the primary infections are streptococcal and pneumococcal, while the *Staphylococcus aureus* is a secondary infection from the meatus; along with it go a number of other organisms, including *Staphylococcus albus, B. coli, B. proteus,* and *B. pyocyaneus.* The latter are no doubt secondary invaders. But the question which is difficult to settle is whether the *Staphylococcus aureus* attacks the middle ear as a primary nasopharyngeal infection. E. P. Fowler of Columbia University, in a series of 2,775 cases in the years 1933 to 1939, found pure cultures of staphylococcus in 36.7 per cent. This is far higher than most authors report, and suggests contamination in taking material from the meatus. It is probable that the *Staphylococcus aureus* is occasionally the primary organism (but much more rarely than Fowler suggests), and that it easily overgrows and masks the primary organism in cultures from the meatus. Certainly it is remarkable how constantly the *Streptococcus pyogenes* is found by the bacteriologist when the culture is made at an operation from pus in the mastoid process or—what is the only absolutely satisfactory method—from chips of bone. This explains the frequent success of sulphanilamide given empirically, though it affords no justification for neglecting bacteriological examination or for not taking care to avoid contamination in collecting material for the laboratory.

The general risks attaching to the administration of these drugs—such as gastric intolerance, leucopenia, and occasionally agranulocytosis—are well known and concern only the exceptional patient. It is perhaps not practicable to obtain blood counts in every case, but if the clinical course is not satisfactory and suggests unusual sensitiveness, which is naturally beyond control, the blood examination should certainly not be omitted. There does, however, appear to be a decided though easily controlled risk arising from insufficient dosage. This insufficiency may come about either by administration in too small quantity (which for an adult should be 2 grammes as an initial dose—continued at the rate of 1 gramme every four hours, taking the age and especially the weight of the patient into consideration), or by administration over too short a period (which should extend to two or three days after all clinical signs have disappeared). If the administration is stopped too soon there may be either a relapse or a subsidence of symptoms, masking incomplete resolution and leading to complication later. Repeated examination of the ear is essential; if the patient is in pain or the tympanum is seen to fill with fluid under tension, paracentesis should not be withheld in the hope that the process will resolve without spontaneous perforation of the membrane. The neglect of paracentesis at the right time may be a factor causing either incomplete resolution and an adhesive otitis with subsequent deafness, or the need for a mastoid operation. Unless these precautions are observed and the patient is kept in bed, it is better to employ the ordinary methods of treatment only. Fowler recommends that treatment by chemotherapy should begin a week or ten days after onset if the patient does not seem to be getting on well without it. It seems reasonable, however, to begin the treatment as early in the course of the illness as possible under the conditions already mentioned. If the best results are to be obtained from the drugs used in chemotherapy their limitations must be recognized and they are not to be regarded as a panacea for all acute infections. The drugs are so powerful that the early results seemed to border on the miraculous, but this is no excuse for using them in a casual way: their very potency demands that they be used in the most efficient manner available.

Sulphanilylguanidine in Acute Bacillary Dysentery

(From *International Medical Digest,* Vol. XXXIX, July 1941, p. 57)

THE amazing successes which have been achieved in the treatment of the various disease entities by chemotherapy with the 'sulpha' drugs are increasing so rapidly that it may well be said that progress in the fight against disease has been greater in the past few years than it has been for several decades. In grim contrast to the wanton and ruthless destruction of human life overseas, these drugs have long since fulfilled Paul Ehrlich's dream of saving life by chemotherapy.

The latest of these life-saving drugs is sulphanilylguanidine, which was first studied by Marshall and his associates. One characteristic noted about this chemical was that, while it is freely soluble in water, it is absorbed poorly in the gastro-intestinal tract. This suggested the possibility of building up a rather high concentration of the drug in the intestinal tract with a relatively low concentration in the blood. For this reason, Marshall and his associates undertook its use in the treatment of acute bacillary dysentery in young infants and children. They treated successive patients with good results, but did not make any controlled study. As a consequence, Dr. George M. Lyon, of Huntington, West Virginia, who has done considerable research in pediatrics, began a study at the suggestion of Commander Stephenson, who is in charge of the Division of Preventive Medicine, of the Bureau of Medicine and Surgery of the United States Navy. Dr. Lyon engaged in this study for the dual purpose of determining the value of the drug in pediatric practice and ascertaining its effect on bacillary dysentery in general. The Navy Department requested him to make this study because of his being a Commander in the Reserve Corps of the Navy. The sulphanilylguanidine was furnished by Dr. E. K. Marshall, Jr., of the Department of Pharmacology and Therapeutics of Johns Hopkins School of Medicine and the Calco Chemical Company.

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Dr. Lyon attempted to evaluate the effect of the drug in the treatment of acute bacillary dysentery by comparing one group of patients treated with the drug with another group of patients who did not receive the drug. He selected alternate patients for treatment with the drug; there were 23 patients in each group.

Inasmuch as bacillary dysentery occurs endemically in the rural and mountainous mining areas of West Virginia and in the Tri-State section of West Virginia, Kentucky, and Ohio, the area afforded a good opportunity for studying the effects of sulphanilylguanidine in acute bacillary dysentery. It has been reliably established that the Flexner bacillus has been responsible for fully 80 per cent of the cases of bloody diarrhœa occurring in this area, and while there has been a decrease in frequency, this condition continues to be a common and important cause of morbidity. In the past decade there has been a remarkable decrease observed in cases among residents of urban districts, and at present, the majority of cases originate among those adjoining rural areas, where community sanitation has been most neglected. Where sanitation has been better developed, there has been a notable decrease in the incidence of the disease.

Dr. Lyon secured the co-operation of 24 physicians throughout the area, so that it was possible to include in his study practically all of the dysentery patients admitted to eight hospitals scattered throughout an area which extended for more than 75 miles to the north and west of Huntington, West Virginia, and more than 125 miles south and east of the same point. The study was initiated in the latter half of September, and completed in December 1940.

All studies and recordings were made in accordance with a prearranged plan. Systematic observations and recordings were made on all patients included in the study. Not all patients were in one locality nor were they all hospitalized, but they were supervised in such a manner that standard procedures were followed and appropriately reliable observations obtained.

In selecting cases for study, an attempt was made to include only those patients presenting a clinical picture which could be classified as 'moderately severe' or 'severe'. For this reason, it was required that each patient have a 'bloody diarrhœa' with blood, pus, and mucus in the stools; have a temperature of not less than 102°F.; and be admitted to observation before the end of the first week of the diarrhœa. The majority of the patients were infants or young children. In three instances, it was either impossible to exclude the patient without upsetting the sequence of the series or desirable to include the patient, because of the peculiarly significant features of the clinical picture presented. Such irregular inclusions were made in the group receiving the drug and tended to make the test more rigid rather than to relax it in favour of the drug. In no instance did they distort the significant aspects of the study.

Alternate selection.—Patients were selected alternately for the treatment group and for the control group on the basis of the time they were first admitted to observation. Many others with bloody diarrhœa had to be rejected because they failed to meet the rather rigid criteria set for selection. Generally this was because they presented clinically a too mild form of the disease or were seen after the first week of diarrhœa at a time when one might expect that the natural recession of the clinical activity would soon follow. To include in the treated group patients of the latter type would obviously distort the validity of the conclusions. It is of interest to note that many of the patients who were not included in the study group were treated with the drug and the results were distinctly in keeping with those of the study group.

Treatment.—The general treatment given the patients of both groups consisted of the usual supportive general measures with insistence on maintaining a good fluid balance and, when indicated, serum transfusions, whole blood transfusions, intravenous glucose, etc. Special attention was paid to the vitamin intake. Laxatives were not permitted. Opiates or phenobarbital or a combination of opiates and phenobarbital was given for relief of tenesmus, pain, and restlessness. Breast-fed infants were permitted to continue on the breast. Whole cultured lactic acid milk was given to the majority of the patients. In general, very bland, high protein, low fat diets were employed while much of the carbohydrate was given in the form of glucose. In all but three instances temperatures were taken by rectum. Cytologic examination of the blood was made at one time or another on roughly one half of both groups. In several of the patients who received the drug, blood level studies were made, the standard employed being the anhydrous sulphanilylguanidine supplied by Marshall. In infants and children, as a rule 0.04 c.c. of blood was drawn, precipitated in a 1 : 200 dilution and the determination completed as described by Marshall. Follow-up studies of the urine and blood were made in an attempt to detect any injurious effects which might develop as a result of the treatment. Stool cultures were done in approximately one half of the cases. Of the patients receiving the drug, one-third had stool cultures positive for the Flexner bacillus. A reliable diagnostic test, generally neglected by physicians in general practice, was employed in many cases where stool cultures could not be made. In these, the purulent material of the stool was subjected to microscopic examination. In all such instances, the characteristic polymorphonuclear cells were found.

In the patients receiving sulphanilylguanidine, the procedure was very well standardized as to dosage, but there was an occasional irregularity in the time at which the drug was discontinued. These few irregularities did not distort the significant features of the study. The drug was given in accordance with instructions proposed by Marshall. The initial dosage was 0.1 gm. per kg. of body-weight and the maintenance dose was 0.05 gm. per kg. of body-weight every four hours until the stools were five or less per 24 hours, and thereafter 0.05 gm. per kg. every eight hours for 48 to 72 hours. The drug was a fine white powder, not very soluble in water, practically tasteless, and not at all unpleasant to take. It was given in a suspension of water or milk. One should be careful to see that it is well washed out of the receptacle in which it is administered. In many instances, it was given by oral gavage in a suspension of lactic acid milk or water. Surprisingly little difficulty was encountered in giving it and it was singularly free from immediate or late toxic effects.

Treatment of patients not receiving drug.—In the patients of the control series, every benefit of modern pediatric treatment was provided, except that no sulphanilylguanidine, sulphathiazole, etc., were permitted during the first two weeks of observation, and no anti-dysenteric serums or vaccines were employed.

The patients included in both groups of the study presented a clinical picture which is encountered with significant frequency by the physicians of the area in which the study was conducted. All of the physicians participating in the study had previously had extensive experience with such cases. They were peculiarly well fitted, not only to supervise the general medical care of these patients, but to express trustworthy opinions as to the efficacy of the drug in this disease.

In attempting to evaluate a therapeutic procedure in acute bacillary dysentery, one must be mindful of the vagaries of the clinical picture of the disease. If one takes the presence or absence of fever as the index of activity of the infection, one cannot be certain of the exact time of onset, because frequently temperatures are not taken until the physician is consulted. Once the patient is under observation, the temperature may, with certain reservations, be taken as an index of the activity of the infection. This has its practical limitations in that most patients continue to suffer from bloody or purulent diarrhœa for some time after the fever subsides, frequently for as long as two weeks or more after the temperature has returned to an essentially normal level.

For purposes of objective comparison, one obtains from the clinical history a more reliable 'onset' if one

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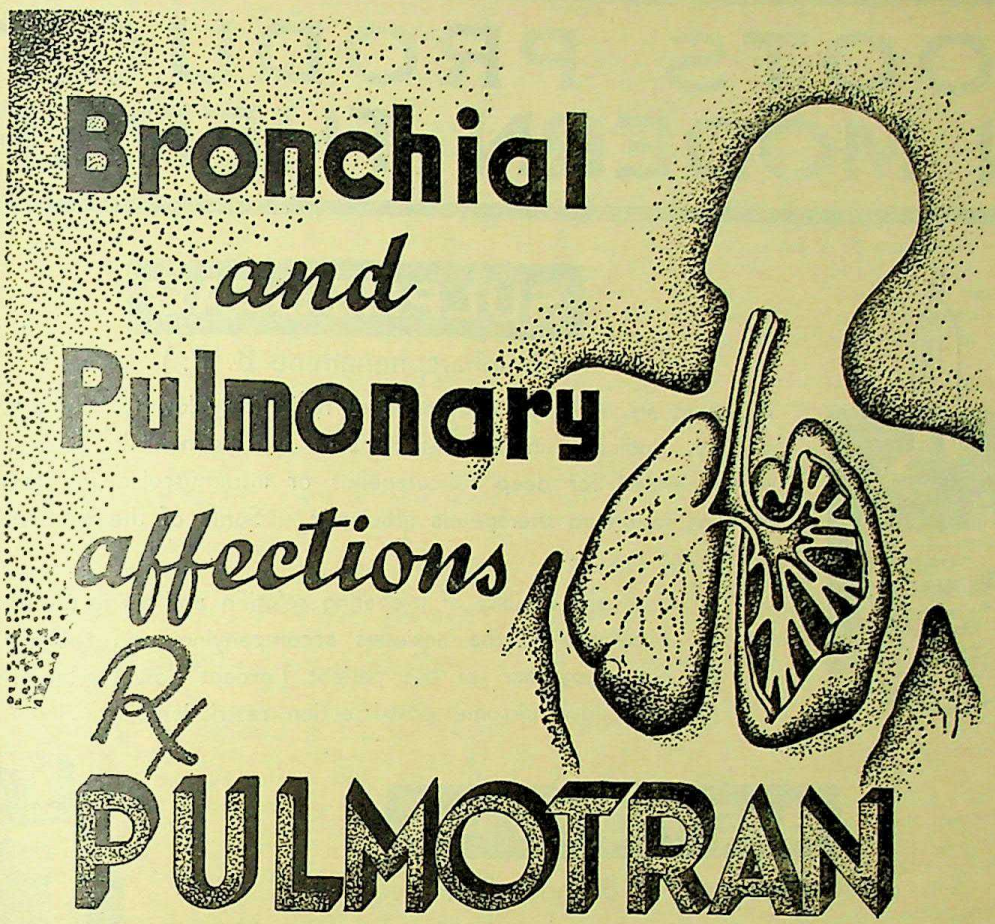

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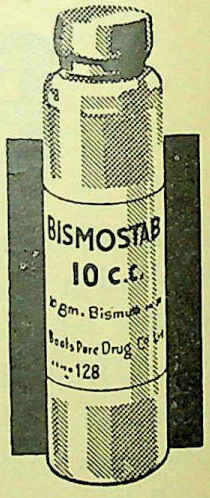

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takes the appearance of the first loose stools as the time of onset. In most instances this will be the first day of illness, but it is not at all infrequent for vomiting and fever or even convulsions to precede the diarrhœal stools by 24 to 72 hours.

Onset of illness in this study has been considered as onset of diarrhœa, although in each case data have been sought for and, insofar as possible, recorded as to probable onset of fever and other evidences of illness such as convulsions, chills, vomiting, etc.

In determining the course of the clinical activity and its recession, three objective manifestations of the disease have been considered, none of which is by itself a completely satisfactory yardstick. One almost never observed the clear-cut end point in the matter of the cessation of diarrhœal stools in the control group that was observed almost regularly in the patients successfully treated with the drug. In the control group, the change from abnormal stool to normal stool was nearly a three to four-day affair, just as it has usually been observed in other patients in the past in this disease.

The temperature curve was observed and when it remained below 38°C. (100.4°F.) per rectum, the temperature was recorded as normal; days of fever were charted on the basis of whether the temperature of a patient did or did not exceed this level.

The number of stools in 24 hours was also considered as a possible index of the clinical activity. When stools were four or less in 24 hours, this was noted and comparisons were made on the basis of the number of days required for the stools to return to this arbitrary frequency.

Neither the temperature curve nor the number of stools in 24 hours can be expected to tell the whole story, so a term similar to that employed by the workers in the Harriet Lane Home has been used. By the use of the expression 'diarrhœa checked' it is meant that the stools were pasty or formed and contained no gross blood or pus and had little, if any, mucus. Generally it meant as well that there were not more than four such stools in 24 hours. Obviously, such a stool is a relatively normal stool. In the patients of the control series, changes in the stools took place in the same manner as in the past. It is a matter of common observation that during the stage when the stools are just beginning to return to normal, there may be one relatively normal stool in the morning with no blood or pus, and sebsequently during the day, one or more small ones will be passed which contain pus or perhaps a little blood. The transition from abnormal to normal may, therefore, extend over as much as three to seven days or more, and yet the clinical progress of the patient may be distinctly satisfactory, with perhaps even some ambulatory activity being permitted.

As the study progressed, it was found that for comparative purposes the onset of the disease could quite satisfactorily be taken as the date of onset of the diarrhœa. Fortunately, in the majority of the patients who received the drug, in marked contrast to those of the control group, the fall in temperature was generally accompanied by, or within 24 to 48 hours followed by, a change in the number and the character of the stools. In almost every instance in which therapeutic benefit was observed, the rather intangible and not at all readily measured general clinical trend of the patient presented a definitely significant aspect, one which in the end is quite as convincing as the apparently better measured indexes, *e.g.*, the 'diarrhœal stool', or freedom from fever.

Conduct of study.—Patients receiving the drug were treated within 24 hours after admission. Records were kept as to the temperature curve, the changes in frequency and character of the stools, and the changes in the general clinical trend. The drug was administered so as to provide a dosage of 0.1 gm. per kg. of body-weight for the initial dose and 0.05 gm. per kg. every four hours for the maintenance dose. When the stools became less than five in 24 hours, 0.05 gm. per kg. was given every eight hours for 48 to 72 hours thereafter. The drug was given suspended in water or milk. In a few instances, it was given for a longer period, largely as an experimental affair, although to some degree because of fear of a relapse. Later it was found that this was, in fact, a rare occurrence and the original plan for discontinuing the drug was adhered to. In some instances, which were beyond control, the drug was omitted before the desired time.

In the general observations which were made, the most outstanding feature was the almost unbelievable improvement in the clinical picture of the patient, which was observed within 24 to 48 hours after the administration of the drug.

While this was not a matter of universal occurrence, the fact that it occurred so dramatically in the majority of patients so treated remains a most significant fact. Its effect can truly be compared to that of sulphanilamide in infections due to some streptococci and to that of sulphapyridine and sulphathiazole in pneumonia due to pneumococci.

In many instances the result was comparable to that which takes place when specific antitoxin is employed in some of the other infections. This dramatic decrease in the intensity of the toxic manifestations of the disease, the striking improvement in the clinical condition of most of the patients, and the rapidity with which this took place were truly remarkable. This can be fully appreciated only by those accustomed to observing cases of bacillary dysentery of such a degree of severity as that which characterized this group of patients. The tendency for the diarrhœa and the indigestion of these patients to drag out over two, three or more weeks, under any form of treatment previously at our disposal, is well known to all who have had experience therewith.

The diarrhœa was considered to be 'checked' when the stools were four or less in number daily, were pasty or formed, and were without gross blood or pus.

In the patients receiving this drug, the transition from abnormal to normal stools was generally rapid. In patients not receiving sulphanilylguanidine, the transition was not so quickly accomplished and the end point was not so clear-cut. In the majority of the controls, the stools continued to be occasionally softer than desirable; they occasionally contained some mucus and, at times, even a little blood or pus.

The tendency for the temperature to return to normal more quickly in those receiving the drug was also an extraordinary feature, and a normal temperature was reached almost as promptly as the stools returned to normal.

In those instances where blood counts were studied and where leucocytosis was observed, the leucocyte count tended to return to a more normal level within 24 to 48 hours after beginning the treatment with the drug. Follow-up studies indicated that it was certain that this was not due to the effect of the drug on the leucocytes. No agranulocytic phenomenon was definitely observed although for a time it was suspected in two cases.

Lyon's conclusion is that there is every reason to believe that sulphanilylguanidine is most efficacious in the first three or four days after onset of fever or diarrhœa and that the percentage of failures may be higher when given later in the illness.

Observations at hand lead to the asssumption that sulphanilylguanidine is an effective agent for the treatment of acute bacillary dysentery. While in the dosages recommended, it appears to be a safe therapeutic agent, it should be used with conservatism and conclusions drawn guardedly. Toxic effects may be observed, but only in those patients with concomitant infections outside the intestinal tract and not, indeed, with certainty then. Its use is attended with fewer toxic side effects than that of the related compounds.

Like other pioneers, Lyon suggests that the final place of this new 'sulpha' drug in the field of chemotherapy can be further established only by appropriate use and study. Nevertheless, the study which he has made is sufficient to justify the belief that another milestone has been reached in the pediatrician's conquest of diarrhœa in young children. The consistent decline in so-called summer diarrhœa, since the turn of the century, has been most gratifying. The decline began

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when Henry L. Coit first made his fight for pure milk at the beginning of the century. The next epoch-making step which further reduced diarrhœas was the curd studies of Brennemann, who demonstrated conclusively that all milk used in infant feeding should be boiled. Added to this, of course, has been a more perfect public health programme, which has brought about community sanitation, a more rational knowledge concerning the nutritional requirements of infants and young children, and, in general, the more careful supervision of these age groups, which has come about largely as a result of the development of pediatrics into an important branch of medicine.

In conclusion, we may repeat what we said of sulphadiazine. This study of the effect of sulphanilylguanidine in acute bacillary dysentery in children is just one more reason why Paul Ehrlich's dream of the advantages of chemotherapy is being realized far more effectively than he had reason to believe it would.

The Influence of Expectorants and Gases

By P. HOLINGER, M.D.
F. P. BASCH, M.D.
and
H. G. PONCHER, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. CXVII, 30th August, 1941, p. 677)

A CERTAIN rationalization of therapeutic procedures used in the management of broncho-pulmonary suppurations and obstructions may be suggested to coincide with the bronchoscopic observations and a study of the effect of therapeutic agents on sputum.

In general, it may be stated that factors responsible for liquefying sputum within the bronchi, thus aiding in its evacuation, consist of those agents which will increase the hyperæmia of the mucosa, as well as those which will increase the rate and depth of respiration.

The action of the expectorant drugs is almost uniformly favourable in liquefying a portion of the sputum which lies in the first and second division bronchi but rarely affects the dependent viscid secretions in the peripheral bronchi.

The actions of gas inhalations are quite specific, and they grossly influence the physical and chemical qualities of both the expectorated and the bronchoscopically obtainable sputum as well as the character of the bronchial mucosa. Steam inhalation, or the inhalation of a high humidity atmosphere, results in the liquefaction of sputum. Carbon dioxide has an action quite similar to that of steam, but to a greater degree. And, in addition, it increases the resorbing power of the bronchial mucosa; consequently it may be considered an extremely efficient expectorant.

Oxygen acts very specifically as an antiexpectorant and therefore its use alone is contra-indicated in obstructive lesions whose obstruction is in part, at least, due to copious, viscid secretions. This deleterious effect may be neutralized partially or wholly through the addition of steam and 5 to 10 per cent carbon dioxide. In this manner not only the tremendous value of oxygen in alleviating the symptoms of respiratory embarrassment or even respiratory decompensation is retained, but also necessary aid in removing the obstruction is administered.

The use of codeine and atropine at regular intervals over long periods of time is contra-indicated in broncho-pulmonary suppuration producing obstructive symptoms; however, the use of atropine prior to bronchoscopy may be justified in reducing the total amount of secretion and thus making the procedure easier for the patient.

Specifically, the use of the various agents described may be of distinct advantage in the treatment of certain diseases in manners determined through these studies. In bronchiectasis and in certain types of asthma in which bronchial obstruction plays a rôle in the symptomatology and pathology, frequent inhalations of carbon dioxide by mask, together with steam inhalations, may be used to augment the postural drainage and bronchoscopic aspiration which are fundamentally important. The use of steam and carbon dioxide between bronchoscopies, and especially shortly prior to bronchoscopy, is indicated if the sputum is known to be extremely thick and tenacious. Such therapy greatly enhances the action of any expectorant drug which is being administered.

In laryngotracheobronchitis, the use of a room kept at 70 to 75F. with a relative humidity of 80 to 95 per cent provides satisfactory conditions for liquefying secretions. If, because of an increasing œdema, obstruction of the airway progresses in spite of the removal of secretions, oxygen may become necessary. In such instances adequate provision for a high degree of humidity in the oxygen tent is essential. The attachment of a mechanical humidifier to the tent in the manner suggested by Davison is the most practical means of accomplishing this.

Post-operative massive collapse of the lung, produced by the occlusion of a major bronchus by viscid mucopus, is almost always spontaneously relieved if the patient can be encouraged to breathe deeply and cough. Steam inhalations aid in liquefying secretions and thus facilitate their removal, but carbon dioxide has become the most commonly used expectorant in the treatment of this disease because of its extremely efficient action in increasing the rate and depth of respiration as well as in aiding to liquefy the secretions. Actual bronchoscopic suction when these agents fail, or if the condition of the patient demands immediate intervention, must always be available.

The influence of the agents studied on the mucosa and inflammatory products of the nasal accessory sinuses has not been studied in detail. It remains to be seen whether an inflamed mucous membrane of the upper respiratory tract is similarly responsive to carbon dioxide when this action is not dependent on an actual increase in the respiratory movements.

Reviews

RECENT ADVANCES IN MEDICINE. CLINICAL LABORATORY THERAPEUTIC.—By G. E. Beaumont, M.A., D.M. (Oxon.), F.R.C.P., D.P.H. (Lond.), and E. C. Dodds, M.V.O., D.Sc., Ph.D., M.D., F.R.C.P., F.I.C., F.R.S.E. Tenth Edition. 1941. J. and A. Churchill Limited, London. Pp. xiv plus 440, with 45 illustrations. Price, 18s.

THE appearance of a new edition of this extremely useful representative of Messrs. Churchill's now famous series has for some time been a biennial event, and we are very pleased that this periodicity has not been disturbed by recent events.

War stimulates medical science in some directions and retards it in others, but most of the advances recorded in this volume may be said to have been made despite the war rather than because of it. The chapters on advances along the three most promising lines, the sulphanilamide drugs, the vitamins, and the hormones, naturally required rewriting. In the case of the first-named, the authors have taken a conservative point of view, and have warned rather than enthused; this is perhaps necessary to counteract the uninformed and prejudiced publicity that has been given to these drugs.

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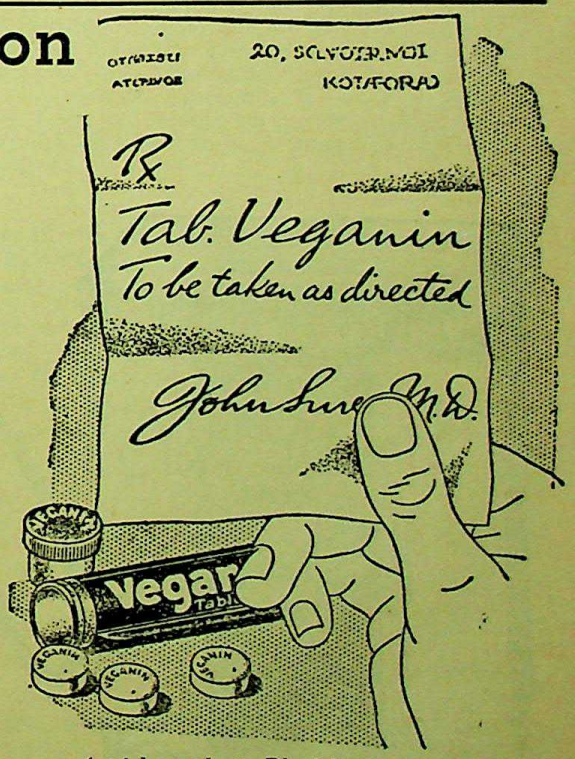

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A trial supply to Physicians on request :

MARTIN & HARRIS LTD., Mercantile Buildings, Lall Bazar, Calcutta.

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WILLIAM R. WARNER & CO., LTD., POWER ROAD, CHISWICK, LONDON, W.4.

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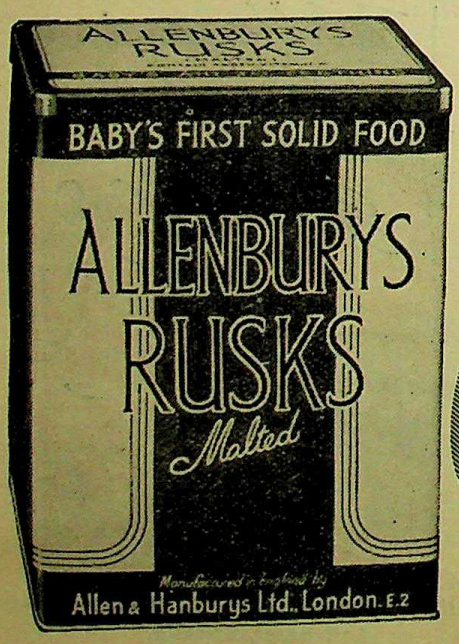
Allenburys Malted Rusks are a valuable food from the age of ten months onwards, and may be used even earlier as a stimulus to salivary secretion and a help to teething. Their use encourages the development of a strong, wide jaw in which there is ample room for the teeth.

Vitamin D (calciferol), in the form of irradiated ergosterol, is added to the Rusks in the process of manufacture, in order to ensure normal calcification of bones and teeth.

The Rusks retain their crispness and flavour under the most varied climatic conditions.

In tins containing ½ lb., 1 lb., 2¼ lbs.



Allenburys RUSKS

ALLEN & HANBURYS Ltd., Clive Buildings, CALCUTTA
(Incorporated in England) and at 37, Lombard Street, London, E.C.3

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Most chapters have been revised and additions have been made. The technique of sternal puncture appears for the first time. It is of course probable that this simple procedure can be performed satisfactorily in many different ways, but the description given does not suggest much practical experience on the part of the writers. There seems to be nothing to recommend oil sterilization; it will mean delay while waiting for the syringe to cool, it will make an already rather small instrument very difficult to control, and the oil will tend to interfere with the staining of the smear. Previous dry sterilization in a test-tube obviates all these disadvantages and introduces no new ones. And it is really ever advantageous to use a hammer? In an experience that is now approaching four figures, the reviewer has certainly never found it necessary.

The effect of the war appears in a section on plasma transfusion, but it is very doubtful if the apparatus for drying plasma that is shown is a satisfactory one. It certainly would not produce any dry plasma in this climate, and complete dryness is essential to ensure good keeping qualities.

This new edition in every way maintains the reputation of its predecessors.

DIETETICS FOR THE CLINICIAN.—By Late Milton Arlanden Bridges, B.S., M.D., F.A.C.P. Fourth Edition. 1941. Henry Kimpton, London. Pp. 960. Price, 45s.

To the medical student of thirty years ago, the word dietetics carried with it a suggestion of quackery or at least faddism, though he probably had an uncomfortable feeling that there was more in this diet business than his teachers seemed inclined to tell him, or he himself was able to find in his textbooks. Beyond being prepared to give some details of the Lenhartz diet, he dealt in general terms, such as a 'low diet', a 'fluid diet', a 'milk diet', without any very exact idea of what constituted these diets. When he went into practice he found that his patients wanted more details than he was able to give and he had to pick up what he could from his fellow practitioners who had had longer experience. Other 'systems' of medicine, however, paid more attention to diet and though the practitioner of scientific medicine openly despised the empiricism of these 'rivals', he observed their results which were sometimes good, but he didn't know where to start to investigate the subject. Then vitamins were discovered. Here was something scientific; he accepted them with open arms, sometimes too open, but they provided the stimulus that was necessary, and to-day dietetics has become a subject of major importance in every branch of curative and preventive medicine.

The first edition of Dr. Milton Bridges' book came to a medical profession hungry for exact information on diet, dietetic values, etc. His book, first published in 1933, was an immediate success and new editions were demanded in rapid succession. The present, fourth edition, is, we regret to say, a posthumous one; but we are told in the preface that most of the edition was planned before the author died and there is certainly sufficient of the previous editions retained to make the book still essentially Bridges'.

There are three major divisions in the book—(*a*) general considerations, in which the physiology and chemistry of food are discussed and the different food factors are described: this part covers over two hundred pages; (*b*) dietetic management of disease in adults, which is self-explanatory and covers nearly four hundred pages; and (*c*) appendix consisting of tables—another three hundred pages. It is in the appendix that the greatest increase has occurred compared with earlier editions.

The book is a mine of information and an invaluable addition to a physician's library. The data are, of course, based on American standards, but with this book, Hutchinson's *Food, The Chemical Composition of Food* (Medical Research Council. Special Report Series No. 235), and *Health Bulletin No.* 23 (Government of India publication price 2 annas of which a new edition has just been published) the dietitian should be fully equipped and prepared to advise patients of almost any nationality.

ESSENTIALS OF DERMATOLOGY.—By Norman Tobias, M.D. 1941. J. B. Lippincott Company, Philadelphia and London. Pp. xii plus 497. Illustrated. Price, 28s.

THIS small book may be regarded as a dermatological dictionary and is well suited for rapid reference for those having some experience on the subject.

In his attempt to be concise the author has made the descriptions of the diseases so short that beginners will find it difficult to understand and use it in making a diagnosis, and from the simple enumeration of treatments without any explanatory notes they will be unable to form an idea of the line of treatment to adopt.

The diseases have been classified according to the symptoms or the regional distribution rather than on an ætiological basis. Urticaria and pityriasis rosea have been placed under erythemas; bacterial diseases have been put under two different headings, the pyodermas in chapter 7 and the deep infective dermatoses in chapter 14; seborrhœa has been described, both under the diseases of the hair and diseases of the sebaceous glands. The author has classified the spirochætal diseases, syphilis, yaws and Vincent's angina, as protozoal diseases, although spirochætes are not protozoa.

Of the true protozoal diseases he has mentioned only a very rare condition 'amœbiasis cutis' but has omitted the much commoner Leishmania infection of the skin. When climatic factors are mentioned the climate of the United States is the only one referred to.

The printing and photography are very good and the following chapters have been well written and give useful information:—

Chapter I the 'Basic survey' dealing with the history-taking, methods of diagnosis and cutaneous manifestations of systemic diseases; chapter IV 'Drug eruptions' and chapter XXXII 'Dermatological therapeutics' describing the various methods of treating skin diseases.

The book may be regarded as a useful summary of the subject but on account of the deficiencies touched on above it is not likely to be of much value to tropical practitioners.

L. M. G.

PICTORIAL MIDWIFERY: AN ATLAS OF MIDWIFERY FOR PUPIL MIDWIVES.—By Sir Comyns Berkeley, M.A., M.C., M.D. (Cantab.), F.R.C.P. (Lond.), F.R.C.S. (Eng.), Hon. M.M.S.A., F.R.C.O.G. Fourth Edition. 1941. Baillière, Tindall and Cox, London. Pp. xii plus 165, with 244 illustrations. Price, 7s. 6d.

THIS is the fourth edition of a book which has now become one of the famous atlases of the literature of obstetrics. It is a great many years since the first edition was written and published, but the great majority of the well-known diagrams which illustrated that edition are reproduced in the volume under review.

There are many new diagrams portrayed in this last edition, and the author may be congratulated on the continuance of this pristine excellence.

The atlas will be of great use to all students of obstetrics.

H. E. M.

SURGICAL NURSING AND AFTER-TREATMENT: A HANDBOOK FOR NURSES AND OTHERS.—By H. C. Rutherford Darling, M.D., M.S., M.S. (Lond.), F.R.C.S. (Eng.), F.R.F.P.S. (Glas.). Seventh Edition. 1941. J. and A. Churchill Limited, London. Pp. x plus 726, with 207 illustrations. Price, 10s. 6d.

THE first edition of this work was published in 1917 just before the end of the 1914–18 war, and it is

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therefore evidence of its popularity that its seventh edition has now appeared having been completely brought up to date in accordance with modern methods of surgical nursing.

A book of this type is invaluable for it enables the medical student, as well as the nurse, to understand fully, certain apparently simple matters which are only too often barely mentioned in the textbooks. *Surgical Nursing* fills this want, and supplies a boon unknown to the last generation. A small criticism may perhaps be made when discussing the chapter dealing with splints; it is that many splints which are very little used at the present time are mentioned, but it is presumed that they are described purely from an academical standpoint.

This excellent treatise should be in the hands of every sister tutor, and any nurse or medical student who knows thoroughly what is in this book will do well in his or her examinations.

H. E. M.

AIDS TO TRAY AND TROLLEY SETTING.—By Marjorie Houghton, S.R.N., S.C.M., D.N. (Lond.). 1941. Bailliere, Tindall and Cox, London. Pp. xiii plus 203. Illustrated. Price, 3s. 6d.

Aids to Tray and Trolley Setting is a most valuable addition to the *Aids* series of books for nurses. The excellent illustrations of all ward procedures will enable the nurse to visualize her needs easily, and they supply an ideal way of teaching correct setting out of apparatus.

The theatre nurse will find the list of instruments at the end of the book particularly helpful as a guide to operation needs.

I shall have much pleasure in recommending the book to my student nurses.

Abstracts from Reports

REPORT OF THE SIXTY-SEVENTH YEAR'S WORK IN INDIA AND BURMA OF THE MISSION TO LEPERS, SEPTEMBER 1940 TO AUGUST 1941

AMONG the major events of the period under report was the retirement, at the age of seventy, of the Rev. Dr. P. A. Penner who began his work forty years ago. When Dr. Penner laid down the work in the spring of this year he left behind a model garden-town of over five hundred leper citizens, with its efficient hospital and treatment service, its well-developed social life and its out-patient work for those still able to maintain their home life. He left behind many who had been restored to health. And he left a large family of rescued children of destitute lepers, now useful and healthy citizens.

During the period under review another outstanding servant of the cause, the Rev. E. B. Sharpe, for nearly twenty years Superintendent of the Purulia Leper Home and Hospital, died at his post. Mr. Sharpe laboured incessantly to bring to his eight hundred patients the means of physical, mental and spiritual health. The erection of hospital wards and treatment centres for the care of the body; schools and recreation hall for the quickening of the mind; increased facilities for private and corporate worship—these represented the all-round effort of Christian realism which marked Mr. Sharpe's labours on behalf of those he so dearly loved. The last building he erected and completed this spring was, appropriately enough, a further house for the accommodation of young boys with leprosy in a contagious form.

It was inevitable that war should slow down fresh developments in the work. What is remarkable is that, despite rising prices, and the many claims of war on our subscribers, especially in Great Britain, it should yet be possible to record any extensions at all. Besides the new leper boys' ward at Purulia, further accommodation for healthy boys at Naini, Allahabad, was completed. Australia had a big share in both these projects. The assembly hall at Zamurradgani, Fyzabad, the gift of English friends, was completed this summer. Indian postal workers helped liberally towards the erection of the social hall at Manamadura in South India. And it was an Indian doctor who gave a fine ward at Chevayur, Calicut, for the care of those suffering from leprosy and tuberculosis—which was completed this summer. A residential crèche for tiny children at Chandkhuri, C. P., was opened early this year. For this Canadian friends are to be thanked. A new doctor's house at Moulmein, Burma, further medical staff quarters at Vadathorasalur, a house for girls undergoing treatment for leprosy at Kothara, Ellichpur, are other additions of the period reviewed. All these buildings provide a striking commentary on the curiously persistent impression that the Mission to Lepers is only concerned with the destitute crippled leper. Because the Mission will not desert the needs of the most hopeless cases, that does not mean that its service is bounded by the care of such cases.

At the end of December 1940, 7,183 in-patients were in the Mission's Homes in India and Burma. This figure shows a decrease of a hundred compared with the number at the end of 1939. The number of healthy children being separately cared for also decreased from 836 to 789. The reductions do not indicate any lessening of need, but only that fresh admissions were cut down until numbers had come within scheduled accommodation, which had often been exceeded. The number of patients in aided homes, 2,472, showed a slight increase and the Mission's financial help to them was maintained undiminished.

Medical results still fall far short of what we would wish, but there is encouragement in the fact that of 10,181 cases treated during the year as in-patients, and of whom records are available, 1,092 were declared 'disease-arrested' before deformity had begun. Another 596 were declared 'disease-arrested', but with deformity.

TRIENNIAL REPORT ON THE WORKING OF HOSPITALS AND DISPENSARIES IN THE PUNJAB FOR THE YEARS 1938, 1939 AND 1940

IN spite of the financial stringency occasioned by famine and war the triennium under review witnessed a considerable extension and expansion in institutions devoted to medical work. During this period 91 (75 in 1940 alone) new dispensaries were opened, and 13 closed down, with the result that at the end of it there were 1,046 hospitals and dispensaries (767 in rural and 279 in urban areas functioning in the Province compared with 968 (693 in rural and 275 in urban areas) at the close of the preceding triennium. The increase took place mostly in rural areas. Ten hospitals were provincialized (5 each in the years 1938 and 1939) making a total of 54 such hospitals. Thus, of the hospitals to be provincialized under the scheme of 1925–26, only 57 remained to be accorded that status. The number of beds in all kinds of hospitals has increased from 11,117 at the end of 1937 to 11,698 at the close of 1940—an increase of 581.

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The Influence of Virol on the Growth of Children

A Summary of Investigations published in the "Medical Officer," March 30 and April 6, 1935*

A NUMBER of children, all receiving their customary home diet, were given either No Supplement, Cod Liver Oil, Halibut Liver Oil (with milk to provide equal calories) or Virol. The experimental scheme provided that each child should have a period on each treatment in turn, in such a way that every possible sequence was included. Rigid statistical control was thus possible.

Gain or Loss in Weight on Various Supplements :—

Supplement	Total gain in ozs. over all periods	Average gain per child per week in ozs. over all periods	Total *loss* in ozs. during summer period only	Average *loss* per child per week in ozs. during summer period only
No Supplement - -	88	0.3	— 103	— 1.4
Cod Liver Oil - -	287	1.0	— 77	— 1.1
Halibut Liver Oil with milk - - - -	333	1.2	— 184	— 2.6
VIROL - - - - -	762	2.6	— 7	— 0.1

Whereas earlier investigations had shown that the mere addition of vitamins had no effect on growth, these investigations have conclusively proved that Virol—a balanced food containing all the necessary vitamins—has a definite and remarkable effect in bringing the rate of growth up to the recommended standard. Virol was the only one of the supplements used that promoted this ideal rate of growth.

Virol was the one and only preparation that maintained the children's weight in the hot weather.

** The full report will be sent on application to Messrs. A. H. Wheeler & Co., Sudama House, Wittet Road, Ballard Estate, Bombay.*

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Agarol Therapy in Constipation

Among the therapeutic measures advocated for overcoming constipation, none has proved more consistently successful than Agarol—the original mineral oil and agar-agar emulsion with phenolphthalein.

It supplies unabsorbable moisture that softens the faecal mass and makes its passage easy and painless. It lubricates the intestinal tract and gently stimulates the peristaltic function, thereby making evacuation certain.

Because Agarol restores the normal pace of the intestinal reflexes, it has earned the approval of physicians everywhere as an effective measure for the relief of acute constipation and for the treatment of chronic cases. Its palatability and freedom from oily taste makes it acceptable to the most fastidious palate.

A trial supply sent to physicians on request.

Martin & Harris Ltd., Mercantile Buildings, Lall Bazar, Calcutta.

Also at Bombay, Madras, Karachi and Rangoon.

Prepared by WILLIAM R. WARNER & CO., LTD., LONDON, ENGLAND.

Agarol

REGD. TRADE MARK

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Under the scheme of 1925–26 it was intended to set up 375 rural dispensaries in the Province. Of this number 364 have actually been established so far. Experience, however, has shown that the benefits which the real village folk derive from the rural dispensaries or the subsidized dispensaries are by no means commensurate with the cost involved in establishing and maintaining them. So a new scheme was formulated in 1938, which combined inexpensiveness with adequate utility. Under this scheme a medical practitioner is settled in a village and paid Rs. 1,200 per annum (Rs. 600 for drugs, dressings, etc., and Rs. 600 for his services). One-half of this sum is provided by Government and the other half has to be found either by the District Board and/or by the local villagers—often organized as members of a Medical Co-operative Society. This scheme, which places the benefits of scientific medicine within the reach of villagers at a nominal cost, has found general favour. It is, therefore, proposed to add 34 men and 5 women practitioners in the coming year to their present number, 83. Apart from this scheme, which is likely to become the basic medical organization of the future, the sphere of usefulness of the already existing rural dispensaries has been greatly enlarged by requiring, since 1938, the medical officers in charge to go round and treat the sick in key villages (within a radius of 5 miles of their dispensaries) on certain days in the week. For defraying the cost of journeys the doctors are paid a fixed allowance of Rs. 10 per mensem. It is significant to note that 359,796 patients were treated in villages by doctors in charge of rural dispensaries.

During the triennium under review medical work for the exclusive benefit of women made notable progress. At the close of the last triennium there were only 97 medical institutions for women, but they have now increased to 130 (50 women's hospitals, 61 sections and 19 dispensaries). There has been a corresponding increase in the cadre of assistant and sub-assistant surgeons. As mentioned earlier, it has also been decided to recruit women subsidized medical practitioners. To encourage the study of medicine among girls the Punjab Government meet the capitation charges of five Punjabi students at the Lady Hardinge Medical College, New Delhi, and award four scholarships of Rs. 20 per mensem each for L.S.M.F. students. Besides, out of the Countess of Dufferin's Fund 21 scholarships of Rs. 30 per mensem each are available for M.B., B.S. students and 28 scholarships of Rs. 15 per mensem each for L.S.M.F. students. The education department also award a number of scholarships. On the welfare side too a notable advance has been made. A sum of Rs. 60,000 was sanctioned by Government to provide scholarships for the training of 100 nurse *dais* and 200 trained *dais*. In the capital of the Province there has been inaugurated a midwifery district in association with a welfare centre attached to the Lady Willingdon Hospital. This, in addition to providing facilities in improved midwifery for women in their homes, assists in the training of medical graduates and of *dais*. The experiment having proved successful the organization of a second district has been sanctioned. Training of health visitors and *dais* continues to be prosecuted with zeal, and health centres are ever growing in popularity.

As noted in the last triennial report there are five leper homes in the province, but the number of leprosy clinics has risen from 100 to 180. The problem of how to rid the homes of non-Punjabi lepers still remains unsolved. A partial remedy may be provided by the decision that in future lepers hailing from other provinces or states will not be admitted to leper homes in the Punjab except on a certificate from a civil surgeon to the effect that they are in a dangerously infective condition.

It is gratifying to note that the people are becoming more and more alive to the necessity of detecting, controlling and curing tuberculosis. Some philanthropically-minded persons have made handsome contributions for fighting this scourge.

The report of the Committee appointed by Government to enquire into the question of instituting a register of practitioners of indigenous systems of medicine and of devising steps for improving their medical education has been received and is under consideration.

Service Notes

Appointments and Transfers

The Governor is pleased to appoint Major-General W. C. Paton substantively as Surgeon-General with the Government of Bengal, with effect from the 23rd August, 1941, *vice* Major-General P. S. Mills, K.H.P., C.I.E., retired.

The undermentioned to be Honorary Surgeons to the King:—

Colonel T. C. Boyd, V.H.S. Dated 14th February, 1941, *vice* Colonel J. Taylor, C.I.E., D.S.O., I.M.S., retired.

Colonel H. J. M. Cursetjee, D.S.O., V.H.S. Dated 23rd February, 1941, *vice* Major-General N. M. Wilson, C.I.E., O.B.E., I.M.S., retired.

The services of Lieutenant-Colonel J. Rodger, O.B.E., M.C., an Agency Surgeon, are temporarily replaced at the disposal of His Excellency the Commander-in-Chief, with effect from the forenoon of the 20th October, 1941.

Lieutenant-Colonel A. S. Leslie, I.M.S. (retired), is re-employed as Residency Surgeon, Kashmir, with effect from the forenoon of the 20th October, 1941.

Lieutenant-Colonel W. M. Will is appointed Deputy Assistant Director-General (Medical Stores), Medical Store Depot, Madras, with effect from the afternoon of the 25th November, 1941, *vice* Major B. N. Khan placed on Special Duty.

Lieutenant-Colonel C. M. Ganapathy, M.C., C.I.E., I.M.S. (retired), is appointed to officiate as Port Health Officer, Bombay, with effect from the 1st December, 1941, *vice* Major C. A. Bozman granted leave.

Major B. A. Porritt is appointed Additional Officer at the Medical Store Depot, Bombay, with effect from the 24th November, 1941.

Major B. N. Khan is appointed officer on Special Duty, with effect from the afternoon of the 25th November, 1941.

The undermentioned officers retire with gratuity and are granted emergency commissions from the dates specified:—

Indian Land Forces

(Short Service Commission)

Captain I. Mallik. Dated 7th December, 1941.

Captain M. S. Rao. Dated 9th December, 1941.

(Permanent Commissions)

To be Captains (on probation)

Kamarazu Narasimha Rao. Dated 7th September, 1941, with seniority from 1st July, 1936.

Sleem Ahmad Mian. Dated 29th October, 1941, with seniority in his present rank from 29th October, 1936, and in the rank of Lieutenant from 29th October, 1935.

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Sayed Ahmad Hasan. Dated 22nd December, 1941, with seniority in his present rank from 22nd December, 1936, and in the rank of Lieutenant from 22nd December, 1935.

Sailendra Mohan Basu. Dated 4th January, 1942, with seniority in his present rank from 4th January, 1937, and in the rank of Lieutenant from 4th January, 1936.

(Emergency Commission)

The undermentioned Lieutenant (on probation) is confirmed in his rank, with effect from the date specified:—

M. S. Yehya. Dated 23rd September, 1940.

INDIAN MEDICAL SERVICE (DENTAL BRANCH)

The undermentioned Lieutenants (on probation) are confirmed in their rank, with effect from the date specified:—

1st February, 1941

M. Ahmad. S. N. Mohammad.
R. Sethi. M. Qureshi.
K. Singh. V. O. Arathoon.
J. Singh.

The undermentioned appointments are made:—

To be Lieutenants

Raymond Thomas Hinde. Dated 14th August, 1941, with seniority from 14th August, 1940.

Paul Stephen Clarke. Dated 14th August, 1941, with seniority from 14th August, 1940.

Emrys Lloyd Jones. Dated 21st August, 1941, with seniority from 21st August, 1940.

Denis Goodwin Horan. Dated 14th August, 1941, with seniority from 14th August, 1940.

Thomas Douglas Brown. Dated 14th August, 1941, with seniority from 14th February, 1941.

Peter Neville Swift. Dated 14th August, 1941, with seniority from 14th February, 1941.

William Thomson. Dated 14th August, 1941, with seniority from 14th February, 1941.

Andrew Donald Wilson. Dated 10th July, 1941, with seniority from 10th January, 1941.

Iain Alasdair MacMillan Beaton. Dated 10th January, 1941.

PROMOTIONS

INDIAN LAND FORCES

(Emergency Commission)

Lieutenants to be Captains

M. S. Yehya. Dated 23rd September, 1941.

2nd December, 1941

H. K. Khalil.
P. F. D'Souza.
P. K. Kar.
U. Mazumder.
B. B. Biswas.
M. K. Siddiqui.
E. J. Ramdas.
J. H. Joshi.
G. B. Godbole.
S. K. Lal.
Y. K. C. Pandit.
K. S. B. Menon.
A. K. Bose.
T. P. Sundaram.
V. V. Narayanamurti.
S. V. Ghurye.
V. D. Shah.
S. S. Kirtane.
H. P. B. Neku.
V. G. Pande.
Bimanesh Bhushan Chatterjee.
G. S. R. Reddy.
P. G. Tampi.
F. B. Laher.
Bibhuti Bhusan Chatterjee.
N. Subrahmanyan.
M. K. Chaudhary.
C. A. Rajamani.
S. A. Qadir.
M. N. Sen.
S. V. Grade.
N. G. Ajgaonkar.
N. G. A. S. Raghavan.
J. G. Rodrigues.
M. A. R. Chaudhari.

3rd December, 1941

S. D. Malaviya. N. T. Ghaisas.

Notes

AVITOL

IN our Notes section in the December 1941 issue under the heading of 'Avitol' we referred to a fish-liver oil under the name Shaliverol. We are informed that the name of this product has now been changed to Sharliverol.

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Original Articles

MAGNESIUM SULPHATE POWDER IN THE TREATMENT OF WOUNDS AND ULCERS

By A. T. ANDREASEN, F.R.C.S.
MAJOR, I.M.S.

THE standard treatment of all wounds and ulcers in India at present depends upon some form of chlorine solution for its mainstay, with the frequent application of dressings.

The wounds met with are often extensive and almost always very foul. Many are the result of neglect of abscesses, ulcers, and knife, axe or other wounds; others owe their foulness to the application of such village cures as plasters of leaves and mud, cow-dung plasters, etc. The ulcers are mainly chronic with considerable fibrosis around the edges and bases; the granulations, if visible, are pale, hard and coarse. Large abscesses and septic joints are very common in Indian practice. They are generally treated along similar lines with chlorine solutions, irrigations, and daily or twice daily dressings. In my experience, such wounds and ulcers do not heal very rapidly with any of the chlorine antiseptics, no matter how frequent the dressings.

In the chronic cases, I felt that no good was being done, judging by the slow progress of the cases, and that in all probability much harm was caused by the powerful action of chlorine upon the growth of young tissue cells, making a feeble effort at repair. I have always felt that *frequent* dressings, wet or dry, were more of a hindrance to Nature than otherwise, in both acute and chronic cases. The fashion of washing away all discharges as 'dirty' has always caused me to think that the old cult of 'laudable pus' is deeply ingrained in many of us, certainly more deeply than any physiological principle of the healing of tissue. However, this was mere conjecture. Hypothesis arose because nowhere could I find at that time (1931) any literature concerned with the study of healing of wounds, using the rate of cell growth as an index of the efficacy and propriety of any method of treatment; all workers had been concerned with the elimination of bacteria and the inhibition of their growth. Because wounds heal whilst subjected to treatment with this or that antiseptic is no indication that the antiseptic in question has any particular specific destructive action on bacteria whilst exercising a stimulative or protective action upon the delicate growing and proliferating cells. Rather are these experiments a demonstration of the extent of maltreatment the body will suffer and Nature overcome.

On the one hand, we had been taught as students that, in response to an invasion by an organic irritant, Nature brings up a large and remarkable force of combatants, specialized and general; that, allowed to go far enough, the fluid containing this army of Nature became an opaque yellow colour and of a thick consistency, *but that the fight went on continuously in this fluid.* Given a reasonable chance, Nature would always win. We were taught that at the same time as the combatants, reconstruction units were marshalled, in the rear, and set to the work of repair immediately, and that certain chemicals in the fluid medium in which these reconstructive units moved, aided and stimulated their activities.

On the other hand, having left the realms of science and moved into the practical sphere we were taught that this day-dreaming was all very well but practical surgery required that the practitioner should 'get on with the job'. We were taught to 'clean' the wounds daily, or more often. It was a sign of neglect to have a pus stain on the gauze dressing. Wounds were irrigated, 'cleaned' with swabs soaked in antiseptics of all kinds, and all judged for their bactericidal power rather than their growth-promoting properties. The two sides of our teaching did not meet. The practitioners were failing to apply the advances of physiology, embryology and pathology to their daily work. Their work was becoming a mere meaningless ritual based on beliefs, having their origin in the dark ages.

At precisely this point, when the writer was realizing the presence of this gap in our application of knowledge to practice, he had the opportunity of working under Dickson-Wright. To him I owe much. His stimulating and reactionary ideas on the treatment of varicose ulcer gave me much food for thought. In his clinic I saw huge ulcers heal visibly under elastoplast, where for months and years no signs of healing had been evoked by any other form of dressing. The ulcers were put at rest, the cells allowed to grow quickly under the stimulus of the vital tissue juices, and elastic pressure necessary for all organized growth was exerted. At the same time as the part was put at rest, active exercise was possible for the limb without disturbing the local condition, and so promotion of blood supply, with all the improvements attendant upon that vital requirement of life and healing, was invoked.

Now, elastoplast is not available to the poor of India, in or out of hospital, as it is too expensive; yet large sums of money are spent on a variety of rather doubtful antiseptic. There are, however, more rational methods, cheaper and easily available.

If a dry gauze dressing is placed over a clean ulcer for 12 hours, then removed and rinsed continuously for 30 minutes in normal saline, and the resulting washings centrifuged, there will be found a small collection of white material, which, when spread on a slide and stained with Leishman's stain, proves to be nothing but millions of young fibroblasts. This is sufficient demonstration of the destruction of

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Nature's reparative efforts caused at each single change of dressing alone. It would appear then to be rational to let the dressing stay in position as long as possible. How long? Ideally until healing has occurred.

Next, take a little pus from the base of a foul wound, place it in a vaseline ring under a cover-slip with a drop of saline to make it sufficiently dilute to transmit light. Place the slide on a warm stage and observe under a microscope what happens. Phagocytes will be seen moving about engulfing particles of debris and bacteria. Many other types of white cell can be seen; and when a smear of this pus is stained, there are certainly many dead cells, *but many more are living cells*, judged by their staining reactions. The bacteria present mostly show signs of degeneration, let it be noted. If the pus was taken very close to the base of the ulcer then many living fibroblasts, few dead cells, and *no bacteria* are found.

It would, then, seem that inside this medium much of Nature's offensive, defensive, and repair work is going on. Why disturb it without any knowledge of what good we are doing, and with much evidence to hand, that, by such action, we, at best, only retard the healing process?

Every one knows the successful outcome of proper application of the Winnett-Orr technique, both in osteomyelitis and in its recent application to compound fractures and war wounds. All of us know the principle underlying the technique.

Thus, the requirements of a rational method of treatment of wounds received in hospital *after the lapse of the period* where primary excision and suture, or excision and packing with vaseline, followed by complete immobilization of the part, could be safely carried out are :—

1. Some form of dressing which accelerates the transport to the part of Nature's forces, without offering any hindrance to their action.
2. This form of dressing must be capable of being renewed without disarranging the growing cells.
3. It must allow the part to remain perfectly immobilized.
4. It must be easily available and cheap; easily prepared.
5. It must be applicable to all types of wound, however infected.
6. It must 'clean' the wound rapidly, *i.e.*, bring it to a stage of healthy granulation where the vaseline technique of Winnett-Orr or the elastoplast technique of Dickson-Wright may be used for the final stage of complete epithelialization.

In short, the primary treatment corresponds to the primary excision of the wound, *plus* the fact that it brings about an early stage of healing, and finishes when healthy granulation has occurred. Searching for a substance to fulfil these conditions, I hit upon magnesium sulphate, thinking that its hygroscopic powers could be used to draw out the tissue fluids with their content of essentials for healing. I first used a saturated solution on gauze. This had the disadvantages in that the dressing was wet, required frequent changing if its power was to be maintained, and hence continually disturbed the wound and removed millions of fibroblasts at each change of gauze, even when left in place for 24 or 48 hours, for the cells grow rapidly along the cotton fibres. It was however a distinct improvement on any other dressing I had used up till then.

Next, I used the crystalline salt, pure, on the wound. This is a slightly painful dressing on the first occasion, but after that there is little or no pain. The pain is always described as a 'drawing' sensation.

The disadvantage of this dressing was that it was difficult in a humid tropical climate to keep the salt dry. Unless absolutely dry, I believe that the effect of the dressing is reduced by at least 50 per cent, for I found that if the crystals are finely powdered and dried carefully before every application, the results were twice as rapidly attained with no more discomfort to the patient.

My technique of dressing is as follows :—

1. Excess of pus and crusts is cleared gently from the edges of the wound with gauze and forceps. Any thick crust or creamy pus is gently lifted away from the centre with the forceps or a spatula, without disturbing the essential layer covering the base of the wound or ulcer which contains all the growing cells.
2. The finely powdered, absolutely dry magnesium sulphate is then poured liberally directly into the wound so as to cover it completely.
3. Over this a light layer of gauze and wool is placed and bandaged firmly with a small many-tail bandage. At the second dressing, which may be done in 12 hours, the many-tail bandage obviates the disturbance caused by undoing a roller bandage. A large amount of fluid will be found to have been drawn out, soaking the gauze and wool, at the first and second dressings.

Excess of wet salt is gently lifted off with a spatula and fresh dry salt applied, without disturbing the underneath layer of salt now in contact with the base of the ulcer or wound. Fresh gauze and wool are bandaged in place as before.

Usually after the first dressing there is no discomfort at the application of the salt, beyond a warm tingling sensation which lasts about 10 minutes.

After four such dressings, there is usually need of changing only once in 24 hours.

At the end of 4 or 5 days, a large ulcer, perhaps previously fouled with cow-dung and with a thick slough on the base, will be

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found covered by a thin crust of magnesium sulphate impregnated with serum, cells, etc. If one edge of this is gently raised, a beautifully red-velvet bed of granulations will be seen where before was foul slough; a pale bluish-white edge of growing epithelium is showing at the edges of the ulcer. I have seen diabetic carbuncles and diabetic ulcers respond quickly to this treatment; I have seen ulcers from which gas-forming organisms, tetanus, and virulent streptococci were grown, clear and become healing ulcers inside 8 to 10 days of such treatment.

A limb with a large ulcer, or foul compound fracture, or septic joint, can be easily immobilized in a plaster case with a window during this primary stage of treatment; such cases transport well. The dressing need not be touched during transport.

When the ulcer bed shows these healthy granulations, the crust of salt is raised gently and lifted off. A thick layer of sterile vaseline is laid over the ulcer bed and edges; over this a light layer of gauze and wool, and a firm roller bandage, or, if available, best of all a complete plaster case. This dressing is left in place for at least 10 days. In the hot damp weather of the Indian plains I found that five days was a better period, as the smell in the heat was practically unbearable. There is no breeze, and verandahs are too hot to put the patients on. In the cold season 10 days is easily tolerated. In the hills and cold parts the case can be left until healing is complete—about 20 to 30 days, according to the size and depth and situation of the wound.

Healing is rapid, scarring is minimum and often nearly absent. Scars are always pliable and freely movable over the underlying parts.

The method is cheap, easily carried out, always available even in the remotest stations, the materials are easily carried in war, there being no necessity for solutions and bottles, and it is *the* most efficient method I know of for cleaning and healing foul, badly-infected wounds. It is far more effective than the solution of the salt. Either magnesium or sodium sulphate may be used; they are equally effective. Magnesium sulphate is more often available.

For over eight years now I have used this technique exclusively. The subdivisional hospitals and dispensaries under my administration all use the method and rely upon it exclusively. Thus, annually, some 4,000 or 5,000 septic cases are treated by this technique, under my direction, and many under my personal care. The stay in hospital of the average large and grossly contaminated wounds has been reduced from 74 days to 21 days. By large, I mean wounds of a surface area of over 6 inches by 6 inches and a depth of 1 inch. Smaller wounds show a correspondingly shorter hospital stay. The method allows of earlier discharge

(*Concluded at foot of next column*)

THE PREPARATION AND USES OF CELLULOID SPLINTS

By G. E. DUNKERLEY, M.B., B.S. (Lond.)
Assistant Medical Officer, Kolar Gold Field

MANY materials are utilized in the making of splints. The word splint means 'a small piece of wood split off', and wood is still popular for temporary fixation, especially in first aid. In orthopædics, plaster of paris is more frequently used than any other retentive apparatus. Its great usefulness depends on its adaptability and on the ease of securing immobilization by maintaining any desired position for only a few minutes during setting. Excellent articles on the technique of using plaster have recently been published by Girdlestone (1940) and by Stonham (1941). It has, however, certain disadvantages, which are formidable obstacles to its use in some conditions, for instance in the

(*Continued from previous column*)

and early assumption of function, since the patients can be discharged in plaster, and return for a change once or twice until healing is complete. Many of the smaller ones, of course, require no plaster, merely firm bandaging, a sling, etc.

Many of my colleagues, having seen the method in operation, have adopted it for their own practice.

It will be seen that it fulfils all the requirements of a good dressing as defined above. In war, it should prove invaluable, since it is noteworthy that I have not yet seen a case of tetanus or gas gangrene in any case treated by this method, during these eight years.

This type of dressing may be used *in any part of the body*, for *any type of wound*. I have used it in treating dirty gun-shot wounds, or gun-shot wounds of regions, and of types difficult to excise completely, with constant success.

In children, I mix an equal portion of boracic acid powder with the magnesium sulphate to take the sting out of the first dressing. Since the introduction of sulphonamide and sulphapyridine preparations, I have used them with the treatment freely, where indicated, without any bad result. Naturally, wounds of the face or jaw opening the buccal or lingual mucous membrane cannot be given those drugs. However, these cases respond particularly well to magnesium sulphate treatment, and it is rarely necessary to think of giving sulphonamide.

I contend that here is a simple, always available, cheap, most effective and efficient dressing, employing and aiding Nature's forces in the process of eliminating infection and of promoting rapid sound healing—a dressing allowing the practice of all first principles, a dressing based on the application of physiological knowledge rather than on cult, or fashion, or prejudice; a type of dressing worthy at least of the attention and trial of any thinking surgeon.

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convalescent stage of anterior poliomyelitis. These are:—

(1) A plaster cast cannot be removed and re-applied for treatment, such as active or passive movements, massage, electrical therapy or cleansing of the patient. Wasting necessarily occurs.

(2) It becomes soiled and loses its consistency owing to moisture from the patient's excretions, particularly in young children.

(3) Plaster sores may appear. When plaster is in use for a long period the development of this unhappy complication cannot be avoided notwithstanding scrupulous attention to technique. The muscle wasting which is inevitable with time makes the plaster cast loose, resulting in friction between it and the skin. This is a more frequent cause of plaster sores than the pressure of newly made casts.

(4) The durability of a plaster case is limited.

(5) The weight of a strong plaster is a considerable drawback resulting in discomfort, physical and mental.

Iron or steel and leather are useful in apparatus for prolonged usage such as spinal jackets, callipers and hip splints. The disadvantages of weight and clumsiness are serious, and special experience is needed to work in these materials. If iron is replaced by aluminium or one of its alloys greater expense is incurred. For spinal jackets, collars and sacro-iliac belts proplastic felt is of considerable use. It is available in sheets which, when subjected to moist heat, become plastic and set on drying. It is an unsuitable medium for use in this country as it is heavy, hot and difficult to keep clean. Starch bandages and waterglass bandages have been widely used in making light splints for the treatment of fractures but have been superseded by plaster of paris.

Celluloid is an ideal substance from which to prepare splints since it is light, rigid and washable, and a wider use of it is urged. Celluloid splints may be made in various ways. It may be obtained in thin sheets which are rendered plastic by macerating in warm spirit for a few minutes, and may then be wrapped round a limb with a layer of cotton-wool outside, when it quickly sets. A special solution called pexuloid is used at the Hospital for Sick Children, Great Ormond Street, London. Celluloid by itself is somewhat brittle and is not easily moulded. The splint described here is not brittle as the celluloid is reinforced with woven material. Though much more arduous to make than a plaster cast it possesses the same attribute of adaptability and in addition to these advantages it is: (1) light, (2) durable, (3) washable, (4) easily and quickly removed and replaced, and (5) fairly cheap to make.

These splints are expensive when supplied by a splint-maker owing to the amount of time and labour involved, but the materials themselves are cheap.

The celluloid splint is especially valuable when some form of retentive apparatus must be worn for a long period, when it is desirable to avoid wasting and to allow remedial exercises, and when, as in children, soiling from excreta is likely. It is commonly used in the following conditions:—

(1) The convalescent stage of anterior poliomyelitis.

(2) The quiescent stage of bone and joint tuberculosis.

(3) In certain fractures requiring prolonged immobilization, for instance, of the carpal scaphoid.

In addition, it is suggested that it would be invaluable in the treatment of post-traumatic paralyses. A number of such cases is likely to arise in the present war and this splint is ideal for maintaining paralysed muscle groups in a suitable state of relaxation during the months which must elapse before recovery can be expected. At the same time local treatment such as massage and exercises is facilitated. A leg splint may be used for walking if the sole and heel are reinforced with leather.

The writer has used the celluloid splint with success in the following conditions:—

(1) Lower and upper limb paralyses following anterior poliomyelitis.

(2) Quiescent tuberculosis of the knee joint and of the spine.

(3) After correction of flexion contracture of both knees.

Method

A plaster shell of the part is first prepared. From this a cast or model, analogous to a shoemaker's last, is made, and on this model the splint is built up (Mercer, 1936).

Preliminary shell.—The ultimate shape and function of the splint are determined by the position of the body and limb during the making of this shell. The part of the body for which the splint is required is therefore placed in the most advantageous posture, paying heed to the usual rules if ankylosis of a joint is expected or if paralysed muscles are present. Next, strips of lead one and a half inches wide are bandaged down the sides of the limb in the position where the shell will be cut for removal. This permits cutting without danger of injury to the patient and without appreciably altering the shape of the plaster (plate V, figure 1).

Plaster bandages are applied without tension, and are carefully rubbed in and moulded over the bony prominences. The lead strips lie between this plaster and the skin and their outline should be discernible. Only a few thicknesses of plaster bandage, sufficient to form a rigid shell after removal, are necessary (plate V, figure 2). The plaster is allowed to dry for a few minutes. Transverse blue pencil lines are drawn over the site chosen for cutting in order to make reconstruction of the plaster accurate (plate V, figure 3), and bivalving is effected by cutting

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over the strips (plate V, figure 4). The two halves are then placed in perfect apposition by restoring the continuity of the blue pencil lines and are united by further bandages placed round the plaster. This plaster shell of the part for which a splint is required is allowed to dry for a day or two (plate V, figure 5). If the plaster does not extend beyond the trunk, *e.g.*, when making a sacro-iliac bell, only one side need be divided for removal (plate V, figure 4).

Cast or model.—Openings in the shell, except the largest, are closed by means of suitably placed plaster bandages. The openings for the hand or toes are not closed in order to allow filling of the narrow portions; for instance, in a shell of the trunk and one leg the opening for the other leg is closed at the hip; in a shell of the trunk alone the lower opening is closed; in a shell of the leg and foot neither opening is closed. When the completed shell is dry the inside is coated with a layer of vaseline or soft soap to prevent the filling, that is shortly to be poured in, from adhering. In doing this, the frayed ends inside, where the plaster had previously been cut, are well rubbed down to form a smooth surface. The vaseline is applied with an applicator made from a stick with a bandage wound round the end. Stout iron wires are prepared to reinforce the cast and prevent breaking. In a cast of the leg and trunk one wire runs from the upper opening to the foot, another stout wire from the ankle to the toes and another in the trunk only. These wires are placed in position in the vaselined shell. The material for making the cast is then prepared. Cement is many times cheaper than plaster of paris and should be used for this purpose. If plaster is used it should be of a cheap variety otherwise the cost of the splint will be unnecessarily great. A mixture of plaster and cement, which is less brittle than cement alone, may be used in narrow places.

Some cement is placed in a basin and quickly mixed with water to make a paste of such a consistency that it will run. An assistant supports the shell with one hand held loosely over the lower opening and the paste is poured in. If necessary it may be pressed down with a wooden rod. When the cement reaches the assistant's hand it is held tightly to prevent the cement running out. If the shell is not completely filled a further quantity of cement is prepared and poured in, but the cast is less likely to crack later if all the cement is prepared at once. The top is finished off level so that the cast can stand on it. This facilitates subsequent procedures.

After drying for two or three days the cast is removed by dividing the plaster bandages where the shell was cut in removal from the patient. The cast is rough and irregular and in some places may not have completely filled the shell. It is made smooth with a coarse file or rasp, the dust cleaned off, and plaster of paris cream rubbed on to make a thin evenly-spread surface. The comfort of the final splint depends to a considerable extent on this procedure, a layer of plaster one-eighth of an inch thick being advisable, especially in growing children. If this layer is omitted the splint made is skin tight and may press unduly in certain situations. The sites of bony prominences should be slightly accentuated at this stage and they must never be filed off in the preliminary preparation. The subsequent comfort of the patient must be carefully borne in mind whilst the cast is being finished off in this manner. The impression of the buttocks is often distorted and in making the cast the normal gluteal outline should be restored. The finished cast is allowed to dry for a day or two, care being taken not to crack the outer layer of plaster (plate V, figure 7).

The splint.—The splint itself is made by placing on the cast successive layers of butter muslin impregnated with celluloid. A solution of celluloid in acetone is first made. Acetone costs approximately twelve annas a pound and one pound is sufficient for about three coats on an average-sized splint. The celluloid is obtained from old *x*-ray films or waste film from cinematograph studios. The latter costs from twenty-five to forty rupees per hundredweight. Modern *x*-ray films of non-inflammable type are unsuitable as they consist of cellulose acetate which is less soluble in acetone than celluloid. To prepare an old *x*-ray film for use it is soaked in warm water for an hour and then the emulsion scraped off both sides with a sharp instrument. The film is next cut into small chips and shaken up in a well-stoppered, wide-mouthed bottle or jam jar of acetone. Sufficient celluloid is used to form a saturated solution and to leave an undissolved residue, otherwise the solution is thin and too much acetone is used. About one and a half *x*-ray films twelve by fifteen inches in size may be dissolved in one pound of acetone and eight or nine such films will be required for an average splint.

Butter muslin is cut into strips three inches wide and rolled into the form of bandages. The end of one of these bandages is placed on the surface of the cast and the celluloid solution is painted on with a one and half inch brush. The acetone quickly evaporates leaving the butter muslin impregnated with celluloid adhering to the cast. The bandage is gradually unrolled to go round the cast in a spiral manner, the adjacent edges should just overlap, and the solution be painted on as the bandage lies on the cast. When the first layer is completed one or two additional layers of solution are applied in order to saturate it with celluloid. Each layer must lie evenly on its predecessor and the bandage may be frequently incised with a knife in order to ensure that it lies neatly, and to avoid the inclusion of air spaces. When a glossy film of celluloid can be seen covering one layer, another roll of butter muslin is painted on and the process repeated until thirty layers of butter muslin

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have been used. An additional coat of solution is then applied to enhance the final appearance.

The splint is now ready for removal from the cast. This is done by cutting it in two halves down the sides in such a situation as is deemed suitable, bearing in mind that the splint will be worn in these two halves buckled together. The splint is pulled off the cast, the adherent plaster inside scraped off and a further layer or two of solution placed inside to give a smooth finish. Whilst this is drying the halves of the splint are placed on the cast to counteract a tendency for this layer to contract and narrow the splint.

The next stage is fitting the splint on the patient. The halves are placed in position and the upper and lower ends marked and later trimmed with strong scissors or a knife. Any other places which require trimming are then dealt with.

A number of quarter-inch holes are drilled in the splint for ventilation purposes (plate V, figure 10) and it is handed to the shoe-maker for completion. The edges of both halves of the splint are bound with leather which is stitched on, and straps and buckles are placed on the splint in suitable positions (plate V, figure 6). It is convenient to have one side of the splint fastened with straps and buckles and the other permanently attached by leather straps acting as hinges (plate V, figure 9). When a splint for the leg and foot is made in this way a strip must be cut off its medial side on the dorsum of the foot to allow ease in applying and removing the splint (plate V, figure 8). In splints for the hand and forearm a separate opening is necessary for the thumb which should not pass out between the halves. When making a shell for a sacro-iliac belt or a spinal jacket it should be heavily moulded into the soft parts above the iliac crests (plate V, figure 5).

Summary

(1) Brief mention is made of the materials commonly employed in the manufacture of splints, and attention is directed to certain disadvantages in the use of plaster of paris.

(2) The advantages of celluloid for making splints are discussed, and the type of case in which this medium is particularly useful is indicated.

(3) A method of constructing celluloid splints is described in some detail.

I have pleasure in acknowledging my indebtedness to Dr. W. B. Roantree, Chief Medical Officer, Kolar Gold Field, for his kind help in preparing this article, and my thanks are due to Messrs. John Taylor & Sons, the Managers, for permission to publish it.

REFERENCES

GIRDLESTONE, G. R. *Lancet, ii,* 287. (1940).

MERCER, W. (1936) .. *Orthopædic Surgery.* Edward Arnold and Co., London.

STONHAM, F. V. (1941). *Indian Med. Gaz.,* **76,** 652.

SIMMONDS' DISEASE

By R. VISWANATHAN, B.A., M.D., M.R.C.P. (Lond.), T.D.D. (Wales)

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IN 1907 Paulesco demonstrated that removal of that pituitary gland caused weakness, loss of weight and death. In 1914 Simmonds reported the first case of the disease called after his name. A woman aged 38 years, after recovering from puerperal sepsis, developed amenorrhœa, increasing weakness, progressive loss of weight, anæmia, and premature senility. He put it down to atrophic degeneration of the anterior pituitary, due to septic emboli. Adequate reviews and compilations of Simmonds' disease have appeared in the medical literature during recent years, notably by Silver (1933), Calder (1932) and Graubner (1925). Farber (1940) reported a case in which he found *post mortem* marked microsplanchnia of all organs, and a pituitary stalk tumour (cystic epithelioma) which was evidently causing pressure atrophy of the anterior pituitary. Though previous reports were mainly based on post-mortem diagnosis, during recent years cases have been reported which successfully responded to replacement therapy with anterior pituitary extract. Dunn (1936) and Moehlig (1936) have reported cases of cure effected by anterior pituitary hormone therapy. Bergmann (1934) described a number of cases of emaciation and leanness which responded to pituitary.

Ætiology.—Post-mortem finding of anterior pituitary degeneration or atrophy is proof positive of the ætiological factor operating in Simmonds' disease. The atrophy is caused not only by septic emboli, as in Simmonds' own case, but also by syphilis, tuberculosis, pressure by tumour, etc.

Symptomatology.—The disease starts insidiously usually during maturity, characterized by cachexia of a remarkable degree. Wasting is so great that the patient is reduced to practically skin and bone. Premature senility sets in with loss of, or grey, hair, falling out of teeth, and dry, wrinkled, toneless skin. There is subnormal temperature. Pulse is slow and feeble. Blood pressure is very much below normal. Sugar tolerance and basal metabolism are diminished. The patient usually does not exhibit any sensation of thirst or hunger.

DESCRIPTION OF PLATE V

Fig. 1.—Strips of lead bandaged in position for making a shell for a spinal jacket.
Fig. 2.—Cutting over the strips of lead.
Fig. 3.—The shell before removal.
Fig. 4.—The shell after removal.
Fig. 5.—Completed preliminary shell.
Fig. 6.—Celluloid jacket for high dorsal tuberculosis of spine.
Fig. 7.—Cast for a leg splint.
Fig. 8.—Completed splint for quiescent tuberculosis of knee.
Fig. 9.—Leg splint showing hinge-straps and buckles.
Fig. 10.—Leg splint in use.

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Fig. 1.

Fig. 2.

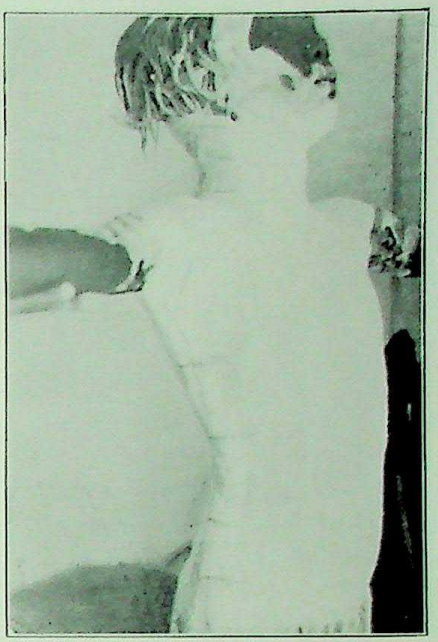

Fig. 3.

Fig. 4.

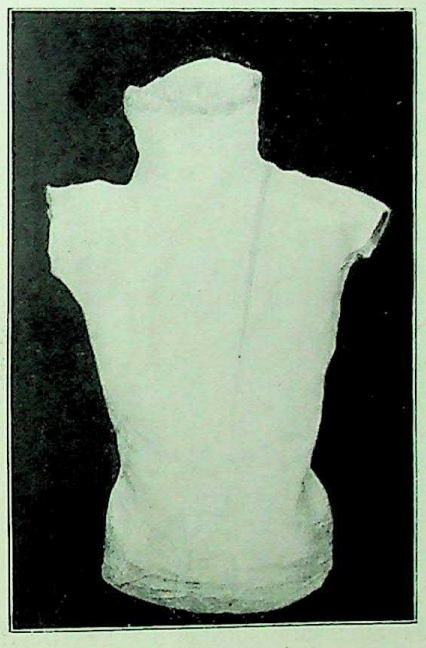

Fig. 5.

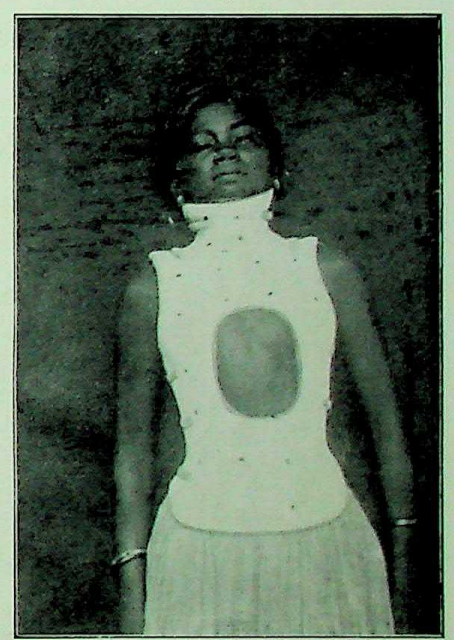

Fig. 6.

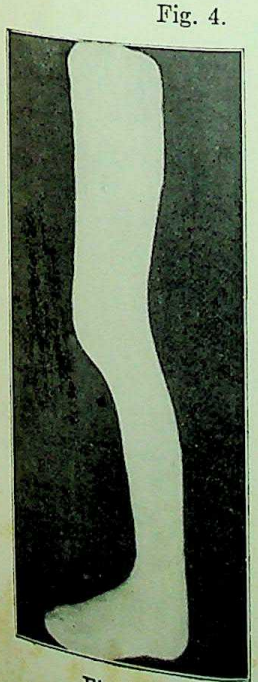

Fig. 7.

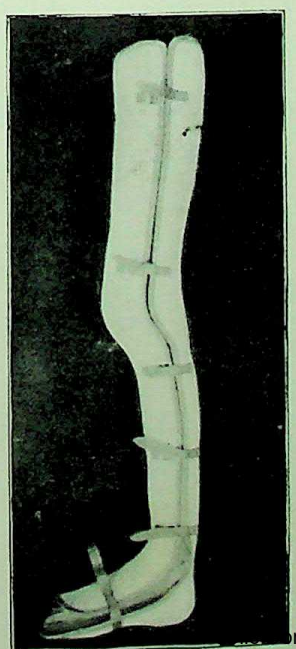

Fig. 8.

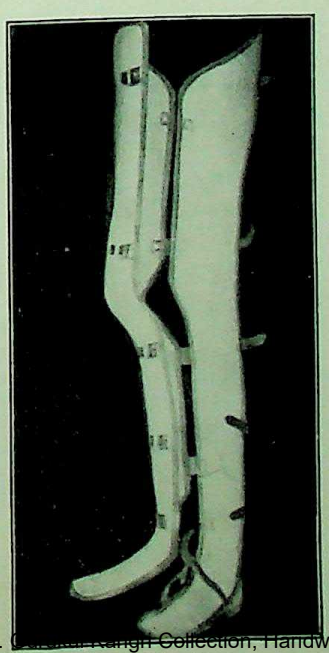

Fig. 9.

Fig. 10.

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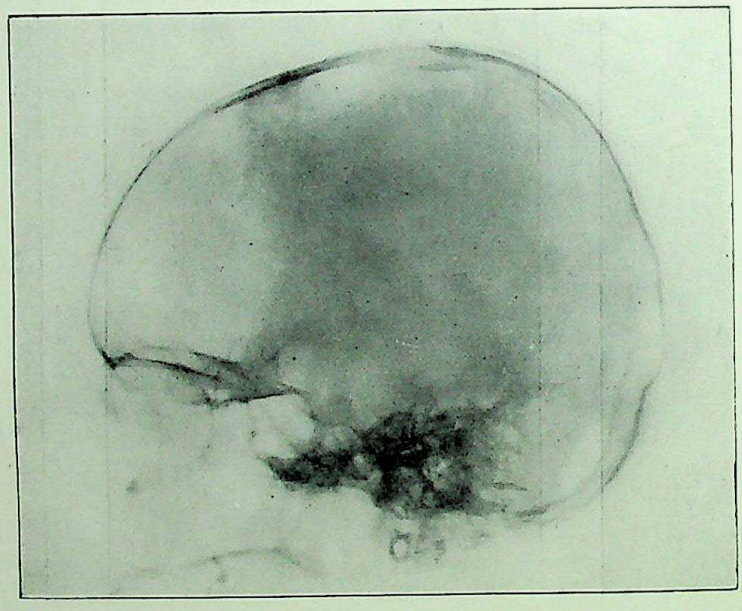
PLATE VI

SIMMONDS' DISEASE : R. VISWANATHAN



Case of Simmonds' disease. Note destruction of clenoid processes, and the round shadow in the sella turcica.

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Excretion of water is reduced. Finally, the patient becomes comatose and dies.

Treatment is as a rule unsatisfactory. But successful results with substitution therapy have been reported during recent years.

The case reported below is in all probability one of Simmonds' disease though post-mortem confirmation could not be obtained unfortunately. *X*-ray findings and the clinical course of the disease however are definitely in favour of the diagnosis.

Case report

Hindu female, aged 50 years, was admitted into the King George's Hospital on 13th August, 1941, for weakness and loss of weight of two months' duration.

Three years back she suffered for three months from continuous fever of undetermined origin. Administration of a dose of snake venom is supposed to have cured her.

Three months back she developed pain in the right hand spreading gradually to the whole of the right upper extremity. This was followed by slowly developing monoplegia. A month later she developed hiccough and vomiting. Her periods had stopped for five years.

Condition on admission.—The patient was in an extremely emaciated condition, lethargic, apathetic, and slow in answering questions. There was no evidence however of any psychic disturbance. Muscular power was weak in the right lower limb and lost almost completely in the right upper limb. There was also slight facial paresis on the right side. Deep reflexes were brisk on the right side. Babinski's sign was positive on the same side. The precordial area of dullness and the area of liver dullness were markedly diminished. Pulse was of low volume and tension, rate being 58 per minute. Blood pressure was 90 systolic and 70 diastolic. There was no sugar or albumin in the urine. Hæmoglobin was 70 per cent. Blood: Wassermann was strongly positive.

C.S.F.—Wassermann positive, moderate; proteins 35 mgm. per 100 c.cm.; globulin present; Langes's test 002221000.

Fundus examination report.—Both discs show signs of optic neuritis. Margins blurred—vessels dilated, tortuous and dark in colour. They are buried here and there by the exudates on the discs. Lamina cribrosa is filled up by exudates.

X-ray examination.—Chest: heart narrow and vertical. Liver shadow smaller than normal. Skull: bones thinner than normal. Pituitary fossa larger than normal. Anterior glenoids destroyed. A dense oval shadow seen in the region of the sella turcica confirmed by stereoscopic pictures.

B.M. rate.—30 per cent.

Glucose tolerance test.—

Before giving glucose	..	91.7 mg. per cent.
½ hour after 30 gm. glucose	..	184.4 „ „
1 „ „ „ „	..	212.8 „ „
1½ hours „ „ „	..	232.6 „ „
2 „ „ „ „	..	213.8 „ „

Progress.—Vomiting stopped within a few days after putting her on 5 units of insulin and intravenous glucose, but, in spite of feeding, cachexia became progressively worse. A state of complete prostration developed; urine and stools were passed in the bed though there was no incontinence. The patient was taken home in a moribund condition. Information was received that she died a week later.

Discussion.—Progressive extreme emaciation, amenorrhœa, increasing lethargy leading to semi-coma and ending in death, the presence of a shadow in the region of the sella turcica as

(*Concluded at foot of next column*)

SULPHONAMIDES IN TOPICAL APPLICATION

By H. J. HAMBURGER, M.D.
Sialkot

THE topical application of sulphonamide compounds is a clinical method of immediate practical importance. A short survey of data from the available literature seems desirable. I am in a position to supplement such survey from my studies on sulphonamides in local use, begun in 1937.

Literature.—As compared with the scores of papers on sulphonamides and related compounds as systemic remedies, the topical employment of the drugs occupied only few workers up to 1940. That is understandable, if we recall that originally sulphonamide was designed as treatment against systemic affections, such as, for instance, septicæmia of streptococcal origin. Here, an even distribution of the chemical throughout the infected organism was required. Wherever the bloodstream is carrying the infection, there sulphonamide action is necessary. But there are circumscribed conditions, in which the full concentration of the therapeutic agent is desired on the spot. If the blood supply thereto is insufficient, as indeed the physiology of the diseased body endeavours to arrange around big purulent cavities, in order to protect itself against invasion by the germ, then topical application offers advantages. At any rate, from the outset of clinical employment of sulphonamides their usefulness in this particular way of administration was revealed.

Small sports injuries, cuts, abrasions were treated prophylactically with prontosil by Jaeger (1936). Other earlier papers on the subject have been reviewed by Hamburger

(*Continued from previous column*)

shown by radiographic examination—low basal metabolic rate and diminished sugar tolerance—are points in favour of a diagnosis of pituitary cachexia which goes by the name of Simmonds' disease. The possibility of Addison's disease is ruled out by the absence of pigmentation.

In this case the atrophy of the anterior pituitary is due to pressure by the tumour as evidenced by the *x*-ray picture. Owing to the positive Wassermann reaction of the blood and of the C.S.F. and the presence of an upper motor neurone lesion, it is possible that the mass causing the pressure was a gumma.

REFERENCES

BERGMANN, G. (1934) .. *Deut. med. Woch.*, **60**, 123.
CALDER, R. M. (1932) .. *Bull. Johns Hopkins Hosp.*, **50**, 87.
DUNN, C. W. (1936) .. *J. Nerv. and Mental Dis.*, **83**, 166.
FARBER, J. E. (1940) .. *Ann. Intern. Med.*, **13**, 2171.
GRAUBNER, W. (1925) .. *Zeitschr. Klin. Med.*, **101**, 249.
MOEHLIG, R. C. (1936). *Endocrinology*, **20**, 155.
SILVER, S. (1933) .. *Arch. Intern. Med.*, **51**, 175.
SIMMONDS, M. (1914) .. *Deut. med. Woch.*, **40**, 322.

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(1939, 1940). Old wounds with sluggish granulations, as for instance in Smith's (1940) case, chronic sores treated by Buchanan, varicose ulcers treated by Smith (*loc. cit.*), and Bosse and Bosse (1939) responded well to sulphonamide ointments and dressings soaked in prontosil. Some reports deal with the benefit which deep abscesses, ulcers, purulent cavities derived from instillations and dressings with sulphonamides. Smith (*loc. cit.*) records their use in perineal ulcers and gluteal abscesses. Empyema cavities were filled with sulphonamide solutions after evacuation by rib resection or thoracocentesis. Dey (1940) used urea-sulphazide preparations in 20 cases of minor surgical affections. Childrey (1939) used irrigation with sulphonamide solutions in resistant sinus infection. Good results were claimed for the method in the treatment of various skin affections such as chronic eczema and impetigo. Tramazaygues and Lascalea (1940) treated 35 cases of pyodermatitis with prontosil orally and locally and found response superior to earlier methods. McKenna (1940) was successful in employing the method against ecthyma and impetigo contagiosa. The intrathecal use for the various types of acute meningitis is in a way also a topical treatment. This is now an established clinical method. Dental uses go to filling of root canals with a sulphonamide paste, and packing of tooth sockets after extraction to ensure rapid healing and non-infection. Adams (1940) recommends a 6 per cent hot sulphonamide solution for irrigating abscesses. The solution may be introduced through a root canal into a peri-apical abscess and drained out through the fistula. Many recent papers not mentioned here are reviewed by Hawking (1941).

Recently, a number of reports has come forward assessing the value of the method in war wounds, as required in the earlier mentioned paper. The first paper dealing with sulphonamide packs in recent compound fractures seems to be by Jensen, Johnsrud and Nelson (1939). *The British Medical Journal* of 6th July, 1940, in a leading article on treatment of war wounds, points out again how desirable research is on the question when to apply systemic and when local methods. Levaditi and collaborators (1940) report favourably on the local treatment with rubiazol or sulphonamide of wounds in which infection was already established. The *Journal* tends to favour the prophylactic use in fresh wounds, and to reserve the systemic application to established infections. Casberg (1940) used sulphanilamide implantation as a method of controlling infection in clean surgical wounds. A series of 18 cases of inguinal herniorraphies thus treated showed no infections, while two control series show pathogenic organisms in several instances. With 8 grammes of powder, no systemic complications were noted, while 10 to 15 grammes of sulphanilamide caused cyanosis in cases of hip fracture treated by open surgical methods.

At the meeting of the Medical Society of London, 28th October, 1940, a discussion took place on chemotherapy and war wounds. Page (1940) stated that he did not think wounds treated with sulphonilamide packs do much better than others treated under identical conditions without it. On the other hand, the number of cases seen was not sufficient to allow definite assessments. Colebrook (1940) at the same meeting emphasized that old burns and road accidents infected secondarily were cleared up with sulphonamide powder within two days, and the wounds healed more quickly. He asked for more detailed data if bacterial growth was held up in the wounds. He thought that the method, provided that confirmation was forthcoming, would form a landmark in surgery.

The necessary evidence has been forthcoming since last year. Hodgson and McKee (1940) describe how they treated successfully 12 cases of compound fractures or perforating injuries from aerial bombardment, with sulphonamide packings of wounds and bullet tracks. In that stage the authors found it still difficult to gauge the actual effectiveness of the method since other surgical procedures, such as plaster casts and anti-gas-gangrene serum were also employed. However, they observed that infection was definitely less than in parallel cases not treated with sulphonamide, though they believed that infection was not particularly virulent in this series. More impressive was the fact that *Clostridium welchii* infection remained confined to the wound tracks. They put that down, in the light of previous experience, to the local sulphonamide application. In one case of established toxæmia, the combination of sulphonamide and perfringens antitoxin helped to avoid mutilating operations. Toennis (1940) employed with satisfaction, for fresh brain injuries after rational surgical treatment of the wound and reduction of prolapsus through repeated lumbar puncture, a Miculicz tampon soaked in prontosil to keep the wound open.

King (1941) used in the treatment of open war wounds powdered sulfanilamide as wound packing. This was never combined with oral treatment. There were controls with flavin packs, also without oral treatment. Detailed technique of the application is given in the paper, main emphasis being laid on the necessity of introducing the powder into all recesses and corners of the wound, to pack the remaining main cavity with about 20 grammes sulphonamide, avoid suture until about 5 days later when the wound, left untouched until then, shows healthy granulations. Fifteen cases formed group I, which were treated soon after the injury, that is before infection was established. Group II were patients with serious injuries heavily infected, some of them with gas-producing organisms. The author feels entitled to state that the cases thus treated did well, if not better than those treated with flavine packs.

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Hawking (1941) undertook a very careful experimental study of the efficacy of local sulphonamides in preventing gas gangrene. Insertion of sulphathiazole into the experimental wounds of guinea-pigs at the same time with the infecting *Cl. welchii, Cl. septique* or *Cl. œdematiens* saved all the animals. Sulphanilamide and sulphapyridine had more selective power. The author does not propose from the results of his experiments that the use of antitoxin can be dispensed with, but recommends its simultaneous administration. Interesting is also the thorough investigation of the mode of absorption through the tissues surrounding the wound. Robson and Wallace (1941) treated a series of 20 cases of second and third degree burns with a paste containing in a glycerine base about 2½ per cent albucid, 40 per cent kaolin and 5 per cent cod-liver oil (euglamide); the results were equally promising in non-infected and in infected cases. In third degree burns a clean surface suitable for grafting was rapidly obtained. Spink and Paine (1940) were successful in treating 12 cases out of 16 with staphylococcical infections, employing sulphathiazole locally. Hawking together with Piercy (1941) supplemented his previously-mentioned studies with a very valuable investigation on blood concentration of sulphonamide after topical use. Patients with open wounds, compound fractures, suppurating sinuses and various ulcers showed, after local insertion of up to 5 grammes of sulfanilamide or sulphapyridine, rarely above 1.5 mg., usually below 0.5 mg., sulphonamide per 100 c.cm. blood. They conclude that topical treatment can safely be combined with oral doses.

Practical experiences.—(1) We have published in this journal (Hamburger, *loc. cit.*) our experiences with two series of 120 cases of Frontier sores and their response to local sulphonamide treatment. The nature of this affection is not quite clear. It is a chronic sore which somewhat resembles clinically cutaneous leishmaniasis, but does not contain leishmania. It may be caused by a virus which is carried by insects. It is usually secondarily infected with a variety of bacteria, as *Streptococcus hæmolyticus, Staphylococcus aureus* or *albus*, or Klebs-Löffler bacilli. The biggest group is that infected with one or other of the common pyogenic organisms. They were treated with sulphonamide topically and responded well, in many instances dramatically.

(2) Several cases of impetigo contagiosa were treated successfully with various ointments containing sulphonamides. I cannot say if and in what way this is superior to other treatments, but it is at least as good.

(3) Three cases of persistent varicose ulcers, partially secondarily infected, with a 1 per cent spirituous solution of prontosil responded well.

(4) One case of pneumococcal empyema was cured with instillation of sulphonamide into the pleural cavity.

Case 1.—Boy, 7½ years of age. One and a half years ago he had a rib resection. Recovered incompletely, and had fever off and on 3 weeks before admission with daily rises of temperature up to 103°F. *X*-ray confirmed presence of effusion in the pleural cavity, filling it up to two-thirds of total thorax height. Thoracocentesis performed, evacuation of pus and instillation of 5 c.c. prontosil soluble. Next day suction through the thoracocentesis tube showed that all prontosil had been absorbed. On third day no pus is left. Again 5 c.c. were instilled, tube removed, and uneventful recovery followed.

(5) Three cases of extensive infected injuries were treated with topical sulphonamides:

Case 2.—A woman had, after a fall off her horse, an extensive sloughing wound over the middle of the front of the left leg. For 3 months prior to admission all other treatments had failed to promote healing. Application of a 5 per cent sulphonamide ointment cleaned the wound, from which streptococcus hæmolyticus had been recovered; within 2 days healthy granulations appeared, and rapid healing occurred.

Case 3.—A man had dropped on right middle finger a heavy piece of wood. To stop the resulting hæmorrhage he tied a string tightly around the base of the finger. Four days after the accident he came to the dispensary, with fever and painful and swollen cubital and axillary glands. One-third of the skin of the finger is torn off. The raw surface is heavily infected, the remainder of the finger is blue-yellow, discoloured and cold. A big clot of blood sticks to the finger-tip, at the beginning of putrid dissociation. After cleaning of the wound, septanilam powder made from 1 tablet spread over the whole wound, petrolatum dressing over it. Next day, all signs of ascending infection have disappeared. The wound is cleaner. Three days continued treatment; thereafter rapid healing and complete recovery.

Case 4.—A man had had a 3-inch long incision at the outer edge of the sole of the foot, 6 weeks before admission. He had apparently had cellulitis. When seen the incision had failed to close. Two sores of 1 inch diameter had formed at the ends of the old incision. Foul discharge. After cleaning, a 5 per cent sulphanilamide ointment healed the wound within 2 days.

Two cases of chronic paronychia were successfully treated. One had lasted 10 days prior to admission, the other for 6 months intermittently. A 3 per cent sulphonamide-milkan ointment with cod-liver oil was applied, which brought relief from pain within 2 hours. By then, all pus was gone, a gauze strip soaked in spirit could now be pushed easily under the nail bed; the ointment was put on top, and healing followed within 3 and 4 days.

(6) Quite a separate and important item is the treatment of certain eye conditions with topical sulphonamides. For some time the treatment of trachoma with sulphonamides internally has been discussed, but opinions are still divided. We have applied sulphonamide to the conjunctiva and, though our studies are not concluded, it seems that patients in the early stages of the affection do well.

For a number of common eye infections, such as impetigo, non-specific granular catarrh of the conjunctiva, phlyctenular conjunctivitis, soluseptasine and soluseptasine ointments have proved a great help. Sanyal (1940) reports similar results with urea-sulphazide. In many instances it was amazing to see how quickly

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the worst suppurative conjunctivitis, often with affection of the cornea, cleared up.

Case 5.—Boy, 4 years of age. History of 'inflamed eyes' for a week. Routine treatment. In spite of that, deterioration. Both sides acute kerato-conjunctivitis, with severe ciliary injection. Right eye shows pea-sized ulcer at sclero-corneal junction. Five per cent sulphonamide ointment applied. Within 24 hours all subjective symptoms relieved. Inflammation and lachrymation decreased, ulcer has not progressed, and is shallower. Within 3 days, cure; the site of the ulcer can no longer be detected.

Case 6.—From the right eye of a 3-year-old girl, a 2½-inch long grass-seed has been removed which had hidden itself in the fold of the lower conjunctival fornix. Parents say that the eye had been bad for 2 months. At any rate the foreign body must have been in for a long time. It had pierced the lower lid from where profuse pus is discharged. Conjunctivitis with ciliary injection. Within 24 hours after 5 per cent sulphonamide ointment application pain and inflammation are gone. The lid abscess has almost closed and is clean.

Failures.—There are occasional failures of the treatment discussed here. One case of an extensive phagedænic ulcer covering the whole forearm and one of a less extensive ulcer on the dorsum of the foot did not respond. In the former I had to resort to skin grafting; in the other to curetting.

Trachoma, once advanced beyond a certain stage, does not respond well. It is also useless to treat oriental sores, that is, cutaneous leishmaniasis, with sulphonamides. Berberin sulphate or antimony is called for.

Dangers.—The great advantage of the topical sulphonamide treatment is that all risks of toxic reactions, which are involved in its systemic use, are avoided. Hawking's (*loc. cit.*) study about the absorption of the drug from packed wounds is very valuable in this connection. I have seen only one case in which the treatment could possibly have made a patient's condition worse.

Case 7.—A man had 3 frontier sores on arm and foot. Three months back he had a smallpox vaccination, the marks of which had not quite healed yet. On both hands he had a chronic eczema; he is a driller in an oil company. Sores responded well to 5 per cent prontosil ointment. He then took without the physician's advice prontosil internally and developed a generalized eczema, which healed only slowly under bland ointments.

It seems necessary to consider the abnormal vaccination, the oral use of prontosil and the occupational factor in explanation of this untoward development.

Dosage and method of application.—In my studies on frontier sores, I have used 6 per cent soluseptasine ointment, prontosil soluble 1 to 5 per cent and prontosil base ointment 5 per cent with equally good results. In all other cases I used soluseptasine soluble or septanilam tablets powdered. These were either applied as powder or, after crushing, incorporated into glycerin for paints or into petrolatum for ointments. A little alcohol and acetone help to dissolve tablets. I have also used an ointment which is commercially available containing 5 per cent sulphonamide and cod-liver oil, together with a milk protein (Milkan). This was also very useful. For ophthalmic purposes it is imperative to use a good ointment base like finest Gainsborough vaseline or anhydric lanoline. Usually 1 per cent is sufficient. Higher concentrations tend to provoke irritation. The vehicle must always be bland. If nothing else is available the contents of ampoules can be used though that is not very economical. For empyema and application to other closed cavities the ampoules are very helpful. Into the cavities of big compound fractures the powder or powdered tablets should be packed. Here any oily or fatty vehicle must be avoided, for obvious reasons.

From the intact surface of the skin and from small chronic areas practically no absorption into the system takes place. Hawking's studies (*loc. cit.*) are based on the incorporation of not more than 5 grammes of the drug. With that blood concentration remains far below the danger level. I would hesitate to employ more than 10 to 15 grammes, especially if concurrent, oral or parenteral treatment might still be needed.

Summary

The recent literature and actual practical experiences on the topical application of sulphonamides are surveyed. The method has been found a great help in minor and major circumscribed septic conditions of about 140 cases. It is considered superior to systemic application in such cases where a high concentration of the therapeutic agent at the site of the lesion can otherwise not be achieved.

REFERENCES

ADAMS, F. R. (1940) .. *Med. Times*, **68**, 499.
BOSSE, P., and BOSSE, G. (1939). *Fortschr. Therap.*, **15**, 202.
CASBERG, M. A. (1940). *J. Missouri Med. Assoc.*, **37**, 473.
CHILDREY, J. H. (1939). *Arch. Otolaryngol.*, **29**, 986.
COLEBROOK, L. (1940) .. *Brit. Med. J.*, *i*, 448 and *ii*, 640.
DEY, A. C. (1940) .. *Indian Med. Gaz.*, **75**, 161.
HAMBURGER, H. J. (1939). *Ibid.*, **74**, 151.
Idem (1940). *Ibid.*, **75**, 76.
HAWKING, F. (1941) .. *Brit. Med. J.*, *i*, 263.
HAWKING, F., and PIERCY, J. E. (1941). *Ibid.*, *i*, 511.
HODGSON, A. R., and McKEE, G. K. (1940). *Ibid.*, *ii*, 147.
JAEGER, K. H. (1936) .. *Deut. med. Woch.*, **62**, 1831.
JENSEN, N. K., JOHNSRUD, L. W., and NELSON, M. C. (1939). *Surgery*, **6**, 1.
KING, A. C. (1941) .. *Brit. Med. J.*, *i*, 231.
LEVADITI, M. C., BRECHOT, H., GERARD-MOISSONIER, and TOURAY, R. (1940). *Bull. Acad. Med.*, **123**, 39.
McKENNA, R. M. B. (1940). *Brit. Med. J.*, *ii*, 99.
PAGE, M. (1940) .. *Ibid.*, *i*, 948.
ROBSON, J. M., and WALLACE, A. B. (1941). *Ibid.*, *i*, 469.

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NOTE ON 'TROPICAL ULCER' IN COORG

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and
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IN the course of nutritional investigations in Coorg (Bhave and Bopaiya, 1942), it was observed that numerous cases of chronic ulcer of the skin and underlying tissues, usually situated on the legs, were under treatment in local hospitals. This condition appeared to be identical with 'tropical ulcer', 'tropical sloughing phagedæna' or 'Naga sore', as described in textbooks of tropical medicine. Some observations with regard to incidence were made and a pathological examination of sections of ulcer obtained by biopsy was undertaken. While these investigations have not thrown any new light on the ætiology of the condition, it is thought worth while to place them on record. The prevalence of tropical ulcer in Coorg has not hitherto been recorded in the literature.

Coorg is a small province with an area of 1,593 square miles and a population (1931 census) of 163,000. It has a heavy annual rainfall of about 120 inches. In general the province is mountainous, with abundant forest and jungle. Rice is cultivated in the valleys. The chief commercial crop is coffee.

Clinical description.—The ulcers as seen in patients applying for hospital treatment are usually roughly circular in shape, and their size varies from 1 to 4 inches in diameter. The usual location is the anterior surface of the lower third of the leg and the ankle. When the patient is admitted into hospital the ulcer is often in a septic and sloughing condition; the edges are sharply-cut and undermined, and show no sign of healing; the base is covered with an ashen-grey slough and there is an abundant offensive discharge; the surrounding skin is red, œdematous and painful. Chronic or indolent ulcers are often seen. In this case the ulcer is usually of long duration and there may be healing at one side while the cicatrix at the other has broken down to form a new ulcer. The healing stage presents the usual features:—raised smooth edges, healthy granulation tissue and relative absence of discharge.

Most cases give a history that the ulcer started after slight or moderate trauma. The general condition is poor, most patients being anæmic as the result of coincident or pre-existing malaria and ancylostomiasis. Signs of malnutrition, *e.g.*, phrynoderma, are often present.

Incidence

The following table shows the percentage of coolies and non-coolies among 200 cases admitted into the civil hospitals in Mercara and Virajpet, respectively, during the years 1938–41. The sex incidence is also shown.

TABLE

Proportion of coolies and males among 400 cases of tropical ulcer

	Civil Hospital, Mercara (200 cases)	Civil Hospital, Virajpet (200 cases)
Number of coolies ..	120	92
Per cent	60.0	46.0
Number of non-coolies ..	80	108
Per cent	40.0	54.0
Per cent of coolies among all admissions.	36.6	29.0
Per cent of males among all ulcer cases.	83.0	81.0
Per cent of males among all admissions.	60.1	63.8

There was a definite preponderance of cases among coolies as compared with other classes admitted into the two hospitals in question; this was more marked in the Mercara hospital group. In Coorg 'coolies' are mainly labourers on coffee estates. Of other admissions into hospital, the majority were ryots cultivating their own land, with a smaller number of townspeople. Males are more liable to attack than females. As regards the age incidence, 59 and 73 per cent in the Mercara and Virajpet hospital groups respectively were between the ages of 20 and 40.

Cases were admitted into hospital at all seasons. There is, however, some tendency for more admissions to take place during the first half of the year. Of the 200 Mercara cases, 121 (60.5 per cent) were admitted during the months of January to June and in the Virajpet group 42 per cent were admitted in May and June. About 4 per cent of all admissions were ulcer cases and usually a prolonged stay in hospital is required. The condition is thus of considerable public-health importance.

Pathological findings

The histological appearances of the ulcer vary with its clinical condition. In acute cases, the superficial layer of the ulcer consists of necrotic tissue in which collections of red blood cells and polymorphonuclear leucocytes are seen. Evidence of coagulation-necrosis, with an increase in the number of polymorphonuclears, is seen underneath this layer. The fibroblasts in the deeper layers are increased. In subacute and chronic cases, the base of the ulcer shows vascular granulation tissue. At the margin of the

*Research Worker in Coorg under the Indian Research Fund Association.

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SANYAL, S. (1940) .. *Antiseptic*, **37**, 421.
SMITH, J. A. (1940) .. *Brit. Med. J.*, *i*, 1016.
SPINK, W. W., and PAINE, J. R. (1940) *Minnesota Med.*, **23**, 615.
TOENNIS, W. (1940) .. *Deut. med. Woch.*, **66**, 57.
TRAMAZAYGUES, M., and LASCALEA, M. C. (1940). *Prensa méd. Argentina*, **27**, 1037.

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ulcer, the epidermis shows hyperplasia, and the edges are undermined.

Scrapings from the surface of the ulcer show in most cases numbers of darkly-staining fusiform bacilli and fine spirochætes (*Treponema vincenti*). The fusiform bacilli are mostly present in the superficial parts of the ulcer below the necrotic tissue, whereas the spirochætes are seen both at the base and edges of the ulcer.

Other organisms, *e.g.*, diplococci, streptococci, and bacilli, are also in evidence.

These appearances closely resemble the description of tropical ulcer given by Roy (1939), Rogers and Megaw (1939), and others.

Smears made from the material aspirated from the base of the ulcer (by puncturing the healthy skin surrounding the ulcer and pushing the needle beneath the base of the ulcer) were negative for *Leishmania tropica*.

Discussion

A considerable literature about tropical ulcer is already in existence. In India it has been given the greatest attention in Assam, where it is usually known as 'Naga sore'. In a previous paper from these laboratories about diet and anæmia in Coorg (Bhave and Bopaiya, *loc. cit.*), the similarity of conditions in Coorg and Assam was pointed out. In both areas there is a large coolie population, employed on tea plantations in Assam and coffee plantations in Coorg. In both areas malaria, hookworm and anæmia are prevalent and there is much malnutrition. It is interesting and significant that a high incidence of tropical ulcer should exist in both places.

The view that the factor of malnutrition is of importance in the causation of tropical ulcer has been put forward by various workers (McCulloch, 1928; Brown, 1935; Clements, 1936; James, 1938; Corkill, 1939). No direct proof of the relationship has, however, as yet been forthcoming. The present investigation throws little further light on the problem. It is, however, worth pointing out that tropical ulcer is relatively rare in tea plantation labourers in the Nilgiri hills. The diets consumed by coolies in this area are as defective as those consumed by coolies in Coorg and Assam (Wilson and Mitra, 1938; Krishnan, 1939; Bhave and Bopaiya, *loc. cit.*, in press). Malaria, hookworm and severe anæmia are rare in the Nilgiris. It thus appears probable that other factors besides malnutrition must be operative in areas in which the incidence of tropical ulcer is high. Presumably these include anæmia and debility resulting from blood-destroying diseases.

Summary

(1) Tropical ulcer is common in Coorg. The greatest incidence is among coolies on coffee plantations.

(2) A histo-pathological description is included and the relation of the condition to malnutrition is briefly discussed.

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PELLAGRA IN THE UNITED PROVINCES

By N. AHMED

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A REVIEW of literature appearing in the *Indian Medical Gazette* on this subject for last 12 years 1928–40 shows that, apart from 40 cases reported in 1931 and 30 cases in 1933 by Lowe from Dichpalli, Hyderabad (Deccan), there are only 34 cases more reported from different parts of India and one from Burma. Out of the 34 cases 12 were seen in Southern India (Guntur 4, Vizagapatam 8), one in Poona, 16 in the Punjab (Lahore 1, Kangra District 15) and 5 in Calcutta. Napier (1939) reports that they encounter 6 to 12 cases a year in the out-door clinic of the Calcutta School of Tropical Medicine. No cases have yet been reported from the North West Frontier, Sind, Baluchistan, Rajputana, Central India, the Central Provinces, Assam, Bihar and the United Provinces.

Pellagra is probably not at all an uncommon affection in those provinces, but it is generally not diagnosed there. It is, in its typical form, so easily diagnosed and with the advent of nicotinic acid so quickly controllable a disease that it is a pity that pellagrins are allowed to suffer for years, only for want of correct diagnosis. One of my cases suffered for four years and in desparation was ready to resign his service twice, and in the end was given up as a hopeless case, when a correct diagnosis put him on to his feet in 20 days, enabled him to regain 42 lbs. in weight, and he returned to work in two months. Napier rightly remarks that if the medical officers would be on the lookout they would often find such cases in

(*Continued from previous column*)

Acknowledgments

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REFERENCES

BHAVE, P. D., and BOPAIYA, M. S. (1942). *Indian J. Med. Res.*, **30**, p. 53.

BROWN, A. A. F. (1935). *J. Trop. Med. and Hyg.*, **38**, 157, 170, 187, 201, 215. (Abstracted—*Trop. Dis. Bull.*, 1936, **33**, 470.)

CLEMENTS, F. W. (1936). *Med. J. Australia*, ii, 615.

CORKILL, N. L. (1939) .. *Trans. Roy. Soc. Trop. Med. and Hyg.*, **32**, 519.

JAMES, C. S. (1938) .. *Ibid.*, **31**, 647.

KRISHNAN, B. G. (1939). *Indian J. Med. Res.*, **26**, 901.

MCCULLOCH, W. E. (1928). *West African Med. J.*, **2**, 96, 101, 104. (Abstracted—*Trop. Dis. Bull.*, 1929, **26**, 109.)

ROGERS, L., and MEGAW, J. W. D. (1939). *Tropical Medicine*. J. and A. Churchill, Ltd., London.

ROY, D. N. (1939) .. *The British Encyclopædia of Medical Practice*, **12**, 256. Butterworth and Co., Ltd., London.

WILSON, H. E. C., and MITRA, D. D. (1938). *Indian J. Med. Res.*, **26**, 131.

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their daily practice. I have encountered six definite cases of pellagra and many more of nicotinic-acid deficiency during my 18 months' stay—December 1938 to June 1940—in the United Provinces. Two cases were seen at Tundla (Agra, 1938), one at Allahabad (1939), two at Moradabad (1940) and one at Cawnpore and Mussoorie (1940).

Three typical cases* are described below :—

Case 1.—A shoe-merchant of Agra, aged 40 years, had very dry skin, cracked lips and severe constipation. He went to Karachi on business in November 1926 and found within a few days dark pigmented patches on his nose, cheeks, chest, back of hands and forearms and on extensor surfaces of legs which became scaly and cracked. He also felt very weak, lost weight and complained of severe indigestion and flatulence. He continued suffering and was diagnosed as lichen planus, dermal leishmaniasis and Addison's disease at various times. He consulted me at Tundla in December 1938. He was, then, very weak, morose, depressed and his skin very thick, black and scaly. The distribution of pigmentation though extensive was definitely symmetrical. I thought of pellagra and treated him with diet of high caloric value giving him meat, eggs, fish, milk, marmite and a cup of raw liver juice after meals. Nicotinic acid was not available. His general condition improved rapidly and his skin condition also changed by the end of January 1939. He continued treatment and changed his monotonous diet of beef curry and wheat chapaties to varied items of food. The next season he remained well and his skin also did not become black as it had done for the last 12 years.

Case 2.—A fair-skinned lady of Agra, aged 22 years, had rough, scaly, dark, pigmented patches on the tip of her nose and cheeks. She also had enlarged cervical and abdominal lymph glands and occasional attacks of indigestion and diarrhœa. Her usual diet was a mixed one of wheat chapaties, *dâl,* vegetables and beef. She had no inclination to eat fruits, eggs and milk. Her attending physician suspected her of suffering from intestinal tuberculosis and lupus on the face. She was brought to me at Tundla in December 1933 for ultra-violet therapy. I gave her a tonic course of ultra-violet and 30 injections of calcium with vitamin D (Glaxo) and a rich nourishing diet. She rapidly improved under treatment and the patches on her face became smooth and lighter in shade but did not altogether disappear. A recurrence occurred and she saw me again in November 1938. She, then, had typical skin pigmentation on the face, hands and forearms, below the scapular regions and eczematous patches on the dorsum of both feet. She was weak, irritable and hysterical. Her diarrhœa and indigestion were very troublesome and she had amenorrhœa as well. Her blood pressure was low, 95/60. She was a complete picture of tabes mesentrica except that the skin condition was not there. I treated her as pellagra. Nicotinic acid was not available. Medicinal yeast, 60 grains a day, and virol were added to a rich diet which she took for months. The improvement was rapid and when I saw her after a time she was in perfect health though I noticed faint reddish patches on her face and roughness of skin on the dorsum of her feet.

Case 3.—A 36-year-old man of Allahabad district, working as 'beldar' and living on a diet of wheat-atta, *dâl* and vegetables had symmetrical and pigmented erythematous patches on the exposed parts of legs, hands and face. He had spastic paresis with stiffness and loss of power of the lower extremities causing difficulty in walking. His knee-jerks were exaggerated. His tongue was flabby showing indentations of teeth laterally but he had no dyspepsia or any other symptoms of gastro-intestinal disturbance. Gastric analysis showed achlorhydria. Total leucocytes 6,000, red cells 3,005,000, hæmoglobin 65 per cent and colour index 1.1. Urine showed traces of albumin. He was first suspected of syphilis of the nervous system and later of leprosy. I saw the case on 27th June, 1939, and diagnosed it as pellagra with associated conditions of vitamin B_1 deficiency.

Treatment.—He was admitted to the railway hospital, Allahabad, and was treated with high protein diet and 5 oz. of wheat germ a day. Iron and arsenic were administered by mouth and liver extract by injection. Nicotinic acid was not available locally. I left Allahabad on 12th July, 1939, and my colleague later on informed me that the paresis and the skin lesions disappeared, his blood picture and hæmoglobin value came up to normal, and he was discharged as fit in a month's time. His case could only be followed for 6 months, *i.e.,* up to January 1940, and in spite of the winter season no relapse of the pellagra symptoms was noticed. He then left the service. The peculiarity of the case is the predominance of nervous symptoms and later on the persisting erythematous condition of skin very closely resembling leprosy, and the absence of practically all gastro-intestinal symptoms to the extent that even the loss of appetite was not complained of by the patient though achlorhydria was present.

Review of the known facts regarding pellagra

Ætiology.—It is now well established that pellagra is associated with nicotinic-acid deficiency. The exact ætiology is, however, not yet clearly understood, and certain attractive hypotheses have failed to stand the test of authentic observations recently made in this connection by various workers.

Association of maize with pellagra.—Chick (1933), reviewing the dietetic theories, mentions that one of the established facts about pellagra is that it is invariably associated with the use of maize as a staple cereal in diet, but in all my cases there is no history of any maize-eating even as a change of diet by choice or necessity. Three cases of Raman (1933) were not on maize diet. Castellani and Chalmers, writing as far back as 1913, record that 'persons who are alleged never to have tasted maize have suffered from pellagra' and Napier (1939) authoritatively asserts that pellagra does occur in non-maize-eating people. The claim, therefore, that pellagra is invariably associated with maize diet is, now, no more tenable.

Theories of maize and other food toxins.—Heatley-Spencer and Biggam (1938) mention that 'it is highly probable that the correct hypothesis is that advanced by Chick', namely, that pellagra is caused by a toxic substance derived from maize, or occasionally from other cereals, which can be corrected by sufficient good protein or perhaps by sufficient vitamin B_2, found to accompany good protein; but as non-maize-eaters do get pellagra, any theory that assumes invariable association of maize with pellagra should not hold good. However, there still remain George Mauriquand's observations that there are certain substances called 'dieto-toxin' which remain without toxicity under normal conditions, but reveal it when diet becomes deficient or ill-balanced. Viewed in this perspective the food toxin theory becomes very attractive. The association of peripheral neuritis with pellagra also lends support to it but the advent

*Full notes on other three cases omitted in interest of space.—EDITOR, *I. M. G.*

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of nicotinic acid has proved that neuritis and similar troubles are associated conditions which do not belong to the pellagra syndrome and are corrected by vitamin B_1, showing their origin in a deficiency rather than in a toxin. The food toxin theories including Chick's hypothesis have also no sufficient clinical or experimental support and therefore do not stand on very solid ground.

Theories of protein deficiency.—These theories assume that lack of protein of high biological value or deficiency in diet of certain amino-acids causes pellagra. In my cases all of them except one used animal proteins. Case 4 had plenty of good proteins and case 6 had milk and eggs. Still they got pellagra. Moreover, nicotinic acid is giving marvellous results even in those cases who continue eating pellagra-producing diet. It, therefore, appears that the deficiency of protein of ordinary or specific variety is not the main causative factor, but as suggested by Napier (1939) a monotonous diet like that of my case 1, who ate nothing but bread and beef curry for years, or rich and varied but insufficient diet of my case 6, or medically restricted diet like that of case 5, are the important factors in producing the symptoms and keeping them up indefinitely until suitably corrected.

Castle's theory of anti-anæmic factor deficiency, as in sprue and pernicious anæmia. Cases of hyperchromic anæmia in pellagrins are recorded. It has also been noted that no improvement in the red cell occurs without liver-therapy (Gupta, 1935), but in my case 4, during the last stages of the disease, though hyperchromic anæmia was present, intensive liver therapy made no impression whatever but response was immediate to nicotinic-acid therapy. Observations like this show that Castle's theory does not fit the picture.

History of vitamin deficiency.—Goldberger cured pellagrins by administering yeast to them and found that vitamin B contains a heat-resisting water-soluble pellagra-preventing substance (P. P. factor) which was named B_2 in Europe and vitamin G in America. Later on it was found that the vitamin B_2 complex contains nicotinic acid, lactoflavine, and B_6 antidermatitis factor. Now, when nicotinic acid is synthetically prepared and clinically used it is the same thing as the P. P. factor of Goldberger and it definitely cures pellagra.

Pellagra appears to be a definite clinical manifestation of nicotinic-acid deficiency which may be produced in the body by a variety of causes and not necessarily by a single definite cause. The syndrome may, thus, manifest itself at any stage of certain exhausting diseases or food deficiency states or as a separate entity resembling a definite disease whenever a severe or complete depletion of nicotinic acid happens to occur in the system due to a pure and simple deficiency, almost in the same way as rickets manifests itself whenever there is a deficiency of vitamin D in the body through any cause whatever.

Age and pellagra.—Pellagra was considered to be an adult disease. The lowest age in Lowe's series of 70 cases in 1931 and 1933 was 14 years. Mitchell, as quoted by Chick, also observed that it was a disease of adults and in that respect differed from other nutritional diseases of children. The above observations are, however, not correct. Napier (1939) mentions that it may occur in patients aged 3 months to 100 years. The youngest patient of mine was 5 years of age. I find that nicotinic-acid deficiency is a very common factor in Indian children belonging even to middle and high-class families. In one building situated on a high hill in Happy Valley region at Mussoorie where 14 middle-class families lived in flats, I saw more than a dozen children who within few days of coming up from plains to the hills got erythematous patches, which later on became scaly and pigmented and were situated especially on the fingers, dorsum of the hands and forearms, the tip of the nose, malar regions of cheeks, and, in cases where the legs were kept exposed, on the extensor surface of legs. I first took the patches to be due to solar dermitis; I wanted to be sure. I took two such cases and to one I gave pellagra treatment and to the other various ointments for skin lesions. The first child was cured without local application within a week while the other continued to suffer for a month. On inquiry, I have also been informed that such dermal lesions at Mussoorie are known to resist all skin lotions and ointments applied locally. My conclusions, therefore, are that pellagra is not confined to adults but may occur at any age and that children in India very commonly suffer from grave nicotinic-acid deficiency which remains undiagnosed, because they generally do not show the skin lesions in the plains, unless exposed to a very dry and cool air and bright sun rays rich in ultra-violet radiations such as are found in Mussoorie in May and June.

Social status and pellagra.—Chick calls it a disease of the poor, but I find that it also attacks the ignorant rich and those middle-class people whose diet remains unsuitable or restricted for any length of time.

Clinical course

Onset.—It is generally gradual, afebrile and without grave constitutional disturbances if the gastro-intestinal or nervous system is not involved from the very first. Three cases of mine remained afebrile all through. Case 1 having seasonal dermitis, had no other troubles for years. Case 5, in spite of skin and mental conditions, continued working for a year until diagnosed, but case 4 starting with gastro-intestinal involvement had so severe an onset that it was taken to be cholera, and case 3, with nervous affection, was crippled from the very start.

Comparative involvement of various systems of body.—There are four particular systems,

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viz, cutaneous (skin), gastro-intestinal (mucous membrane), nervous, and circulatory that are generally involved.

Skin lesions.—They are the most characteristic feature of the disease. In 4 out of my 6 cases skin lesions were first to appear or probably first to be noted. Rau and Raman's observation is the same. Lowe held the same view in 1931 but remarked in 1933 that glossitis may be the first symptom to appear. However, skin lesions are so characteristic that a definite diagnosis of pellagra is very difficult in their absence. I have been very fortunate to have come across practically every sort of skin lesions and in all their stages. One of my cases had 'butterfly patch' on his face. The dark 'collar patch' on the neck which is generally so very marked and striking was also observed by me from the very date of its appearance until the day of its disappearance under treatment. The initial and successive stages of the skin lesions were noted by me in case 6 as thickened, angry-looking, erythematous patches on the skin between the fingers. The erythema disappeared within three days leaving a dry, scaly, dark-brown patch with a minute raw surface in the centre, while in case 5 similar patches which were a year old were found to be thick, rough, black and having a scaly core in place of the raw centre noted in the initial stages of the other case.

Causation of the skin lesion.—A dry and cool season and strong sun-rays are definitely the exciting causes, but whether sun-rays activate a pre-toxin or merely act as a trauma, or whether it is the presence in the blood of a toxin of dioxy-phenylalamine type (dopa) which resembles tyrosine that gives the skin pigmentation is not yet definitely settled. However, I think that 'effect of sun is purely a matter of trauma' (Stannus, 1937). My observations show that a destructive dose of ultra-violet rays gives pigmentation of the skin only in a person with nicotinic-acid deficiency and even then only when the skin is prepared for it by a dry and cool season, and, as Lowe (1933) points out, when there is marked difference between day and night and sun and shade temperatures which make the exposed part of the skin dry and liable to cracks.

In one of my cases there was evidence that the rubbing of the shoes had caused the pellagrous dermatitis.

Gastro-intestinal lesions.—Lesions of the mucous membrane, when they do occur, are generally not of the ulcerative but of the atrophic type. They are followed by grave constitutional disturbance. In one case the disease started with diarrhœa and vomiting; he suffered for a year and was almost dying when recurrence occurred.

Case 2 had skin lesions in the beginning but, when diarrhœa started, her health was so much disturbed that she looked a picture of advanced tabes mesentrica. However, diarrhœa is not a common complication and occurs only when the disease attacks in a severe form. Three cases out of the six had constipation, loss of appetite, vague abdominal pains and troublesome gases in the intestines, but never diarrhœa. The lesions of the tongue and fauces are also not always present. Lowe (1931) noted such lesions in only 50 per cent of his cases.

Lesions of the nervous system.—Nervous lesions in pellagrins do not all belong to the pellagra syndrome. Peripheral neuritis and involvement of the cord, such as was present in case 3, are associated conditions and are often due to vitamin-B_1 deficiency. 'Mental conditions' like the depression almost melancholic in nature which made my case 4 resign his service twice and despair of his final recovery, or the suicidal tendency which my case 5 had, definitely come under pellagra syndrome and are very easily cured by nicotinic-acid therapy. Lowe recorded a case of pellagra (1931) who became so 'mental' that he actually committed suicide by drowning. Cleckley, Sydenstricker and Geeslin (1939) treated with nicotinic acid 19 cases of a typical psychotic state with malnutrition in elderly patients suffering from arterio-sclerosis and other chronic diseases, with great improvement in 4 cases and dramatic 'cure' (of psychotic state and glossitis) in the rest. The presenting symptoms were those of chronic diseases *plus* 'hebetude to profound stupor' and in 4 cases glossitis, but dermatitis and gastro-intestinal symptoms were not present. They came to the conclusion that 'many patients are allowed to die because of failure to recognize the cerebral symptoms of pellagra when other evidences of the disease are absent' and that 'a therapeutic test with nicotinic acid is justified in unexplained cases of hebetude or unconsciousness'. They also agree with the suggestion of Jolliffe that cerebral manifestations may be the first evidence of severe or complete depletion of nicotinic acid.

Circulatory lesions.—Myocarditis and degeneration of heart-muscle in pellagra cases have been recorded but I am not sure whether pellagra is responsible for the troubles or the gradual heart failure is due to prolonged suffering and continued severe illness. I noted in my case 4 that the œdema of feet and hands, dyspnœa, rapid and weak pulse and the blood pressure as low as 92 systolic and 59 diastolic, all suddenly improved to normal within 20 days of beginning nicotinic-acid treatment. I wonder how one could explain such a rapid and dramatic recovery of a failing heart if we persuade ourselves to assume that it was solely damaged by prolonged and severe illness and not directly by nicotinic-acid deficiency.

Diagnosis.—Skin lesions in my cases were mistaken for simple dermatitis, lichen planus, dermal leishmaniasis, Addison's disease, lupus, leprosy, eczema, syphilitic pigmentation, spider lick, scabies and solar dermatitis. Gastro-intestinal conditions were wrongly diagnosed as tuberculosis of intestine, hill diarrhœa, cholera,

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chronic dysentery, sprue, colitis, dyspepsia, gastric ulcer and deranged liver. The mental states were taken to be due to anxiety and worry, hysteria, syphilis of the nervous system, nerve-leprosy, depression and despair due to prolonged illness, over sensitiveness, neurasthenia, melancholia, malingering and mental backwardness in the child. The above mistakes made by very highly qualified and experienced doctors should be enough to show that pellagra can be diagnosed only if we always keep its existence and its definite manifestations in mind when dealing with our cases of skin, gastro-intestinal tract and vague nervous and mental conditions in places with a cool and dry season and plenty of strong sunshine.

Laboratory findings.—These do not help much in the diagnosis except that achlorhydria is frequently found. Stools and urine show nothing except that when diarrhœa is present it is of lienteric type with non-fatty stools. Urine test for porphyrin was not done in my cases and I believe is not of much help in clinching the diagnosis. Hypotension is common. Total leucocyte count is generally normal, total red cells below normal and hæmoglobin value may or may not be very low. Hypochromic anæmia is believed to be commonly present but cases with megalocytic hyperchromic anæmia, including two of my own cases, are recorded. The latter type so closely resemble pernicious anæmia that one can be very easily mistaken for the other, if the characteristic skin lesions of pellagra are not present or not carefully noted and the therapeutic test with nicotinic acid is not tried in very doubtful cases. Wilkinson (1936) goes so far as to say that 'it is highly probable that in the more tropical zones cases of what is essentially pernicious anæmia may so closely resemble sprue or pellagra as to be so diagnosed according to local bias'. As cases of true pernicious anæmia are almost unknown in India, Wilkinson's remarks could be reversed and we may say that no case should be diagnosed as pernicious anæmia unless pellagra is definitely excluded. Apart from characteristic skin lesions and a favourable history the only sure test for pellagra available to us is the therapeutic test with nicotinic acid, which has assumed such an importance that if a suspected condition gives no response to the test it may be taken to be due to anything but pellagra.

Prognosis.—In India, Lowe had a mortality of 50 per cent in his cases with mucous membrane involvement in 1931. He also thought that most mental cases end fatally. In 1933, when 60 grains of yeast and half a pound of meat a day was added to the dietary of his patients the death rate became *nil*. The introduction of nicotinic acid has now made the prognosis invariably good. My case, 4, who was in the terminal stage of the disease recovered so rapidly that I now believe that if nicotinic acid is available no case of pellagra should ever be declared as hopeless, in whatever condition he may be.

Treatment.—I find that when nicotinic acid is not available, cases of pellagra can very successfully be treated if 60 grains of yeast, 5 ounces of wheat germ, and a cupful of raw liver juice, or two cups of liver soup, prepared without addition of water in a steam cooker, are added to a daily liberal mixed diet and iron and arsenic given when needed. I treated the first three of my cases on the above lines. The results were rapid and good. The skin condition of case 1 did not clear altogether. The last three cases received nicotinic acid as well. The results were dramatic. As for doses, case 1 got 500 mg. a day by mouth for 10 days, 200 mg. for another 10 days, 100 mg. for two days in a week for about 2 months, and is now having 100 mg. for 2 or 3 days once a fortnight, as a maintenance dose. To combat anæmia, weakness and loss of appetite during convalescence I find caldeferrum (Glaxo), two tablets immediately after meals, an excellent iron tonic. Liver injections are essential for cases with hyperchromic anæmia and vitamin B_1 for actual neuritis, paresis and similar associated conditions. Anti-diarrhœa mixtures and powders usually do not control diarrhœa of pellagrins, and when they do they produce sickness, distension, heaviness and uneasy feeling in the abdomen. I find that one or two teaspoonfuls of ispaghul mixed in a small quantity of curd (*dahi*), swallowed without chewing, prevents diarrhœa without causing any inconvenience The residual diarrhœa persisting for 2 months after nicotinic-acid treatment in one case did not yield even to opium but did so to ispaghul in two days.

Sodium thiosulphate.—Sabry in Egypt got good results by intravenous injection of sodium thiosulphate in pellagra cases. He thought the drug neutralized the maize-toxin which circulates in the blood of pellagrins. Lewis (1938) reported that he cured a case in Burma by giving 10 c.cm. of 10 per cent sodium thiosulphate intravenously twice a week. He gave no other treatment to his case. Rau and Raman (1936) found that protein diet and liver soup gave invariably good and rapid results, whether sodium thiosulphate was given or not. Napier (1939) recommends its use for rapidly clearing the skin lesions in pellagra. I have no experience of it and find no records to show that dermatitis of pellagrins could rapidly be cleared by injection of sodium thiosulphate. However, as the skin condition, especially when in a chronic state, does not altogether clear for months after even combined nicotinic-acid and B_1 and B_2 treatment, sodium thiosulphate deserves a trial.

My thanks are due to Dr. F. E. R. Laborda, the Chief Medical Officer, East Indian Railway, for permitting me to submit this paper for publication. I have also to thank my colleagues, Dr. S. N. Lahiri, D. M. O., Allahabad, for sending me the follow-up notes of case 3 and Dr. B. G. Kane, D. M. O., Moradabad, who supervised the treatment of cases 4 and 5.

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A NOTE ON EVE'S HALOMETER

By PRAN NATH CHUTTANI, M.B., B.S. (Punjab), D.T.M. (Cal.)

RECENT inquiries have shown that a large number of important medical teaching institutions in India are still using the Eve's halometer for measuring the red cell diameter. Outside India also, the instrument continues to be treated with respect by some workers (Beaumont and Dodds, 1941). The observations recorded in this paper were made during the course of an inquiry into anæmias at the Mayo Hospital, Lahore, in 1939. In thirty-one cases the average red cell diameter was estimated both by Eve's halometer and Price-Jones' method from blood smears taken at the same puncture. Halometric observations were carried out on the same day on dried, unstained and properly-made blood films, but the Price-Jones curves were drawn from the preserved Giemsa-stained films about a year later at the School of Tropical Medicine, Calcutta. The thirty-one double diameter observations and the corresponding mean corpuscular hæmoglobin values have been tabulated.

The value of correlation between the Price-Jones and the halometric readings (*see* table) works out to 0.1979, which has no statistical significance. Accordingly either one or both the instruments are definitely biased. The means of the two series are also significantly* different from each other at even one per cent value.

TABLE

Mean diameter of 500 red cells as obtained by the Price-Jones method	Mean diameter obtained by Eve's halometer	Mean corpuscular hæmoglobin values
μ	μ	$\gamma\gamma$
6.73	8.00	30.78
7.16	8.10	26.36
7.50	8.00	29.39
7.64	7.40	29.31
6.88	8.19	28.50
7.41	8.00	20.11
6.74	7.80	20.52
6.87	8.40	25.65
6.45	7.90	21.60
5.85	7.65	23.67
6.45	7.65	22.44
7.21	7.90	11.80
7.24	7.80	22.50
6.92	7.90	20.31
8.12	8.44	40.18
8.27	7.70	40.18
9.06	8.20	43.06
8.06	8.60	39.79
8.03	8.39	46.63
8.22	8.20	46.03
8.00	8.00	38.30
8.40	7.80	34.20
8.06	7.80	53.10
7.37	7.70	34.94
7.66	8.40	20.72
7.42	8.40	20.30
7.21	8.20	27.48
7.40	7.80	34.20
7.86	7.00	33.34
8.29	8.20	39.97
7.85	7.90	36.39
Average mean. 7.49	7.98	31.02

The figure drawn to bring out sympathetic growth, if any, between the two methods also shows a complete lack of relationship. Adopting the standards of Price-Jones for macrocytosis and microcytosis we find that according to the halometer twenty-five cases are definitely macrocytic, four are suspiciously macrocytic and only two are normocytic. (It may be noted here that in this investigation selection of halometrically macrocytic cases was deliberate.) According to observations taken by the Price-Jones method, on the other hand, it is found that only twelve cases are definitely macrocytic, two suspiciously macrocytic, twelve normocytic, three definitely microcytic, and two suspiciously microcytic.

The macrocytic cases by the Price-Jones method appeared to bear greater correlation to the corresponding halometric observations than

* Unqualified significance means significance of 5 per cent value.

(*Continued from previous page*)

REFERENCES

CASTELLANI, A., and CHALMERS, A. J. (1913). *Manual of Tropical Medicine.* Baillière, Tindall and Cox, London.

CHICK, H. (1933) .. *Lancet, ii,* 341.

CLECKLEY, H. M., SYDENSTRICKER, V. P., and GEESLIN, L. E. (1939). *J. Amer. Med. Assoc.,* **112,** 2107.

GUPTA, S. N. (1935) .. *Indian Med. Gaz.,* **70,** 148.

HEATLEY-SPENCER, J., and BIGGAM, A. G. (1938). *British Encyclopædia of Medical Practice,* **9,** 468. Butterworth and Co., Ltd., London.

LEWIS, D. R. (1938) .. *Indian Med. Gaz.,* **73,** 616.

LOWE, J. (1931) .. *Ibid.,* **66,** 491.

Idem (1933) .. *Ibid.,* **68,** 379.

NAPIER, L. E. (1939) .. *Ibid.,* **74,** 136.

RAMAN, T. K. (1933) .. *Ibid.,* **68,** 381.

RAU, G. D., and RAMAN, T. K. (1936). *Ibid.,* **71,** 570.

WILKINSON, J. F. (1936). *British Encyclopædia of Medical Practice,* **1,** 408. Butterworth and Co., Ltd., London.

BIBLIOGRAPHY

AHMED, N. (1939) .. *Patna J. Med.,* **14,** 316.

BAJAJ, N. L. (1939) .. *Indian Med. Gaz.,* **74,** 145.

EDITORIAL (1939) .. *Ibid.,* **74,** 163.

GHOSH, M. (1939) .. *Ibid.,* **74,** 318.

GOODALL, J. W. D. (1940). *Ibid.,* **75,** 147.

MODY, M. S. H. (1935). *Ibid.,* **70,** 625.

SEN GUPTA, P. C., RAI CHAUDHURI, M. N., CHAUDHURI, R. N., and NAPIER, L. E. (1939). *Ibid.,* **74,** 143.

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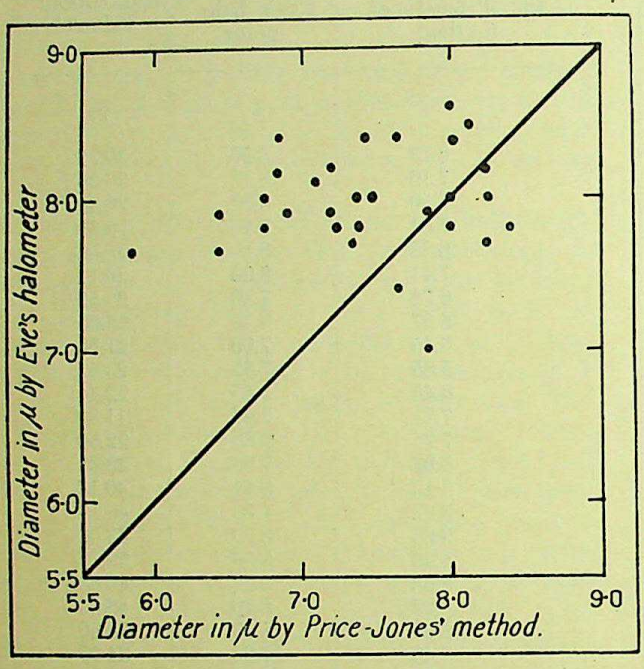
did the normocytic or the microcytic cases. To subject this impression to statistical analysis the Price-Jones observations were split up into two groups, macrocytic (suspicious and definite) and non-macrocytic, and the correlation values with the respective halometric readings were calculated again. The correlation values in both the groups were not significant.



That the method of Price-Jones is the most accurate means of measuring the red cell diameter is an established fact and the above figures, with this background, speak for themselves and show that Eve's halometer is an entirely erroneous instrument.

Discussion.—Accuracy of Eve's halometer has been investigated previously and although the instrument yielded dependable results in normal individuals (Chaudhuri, 1933), yet in anæmia patients it was shown to be of no practical value, (Napier and Das Gupta, 1936). These workers held the halometer to be responsible for many errors of diagnosis in India. They pointed out that although accurate red cell diameters had a definite positive correlation with colour indices, the Eve's halometer, being an erroneous instrument, showed very often a combination of macrocytosis and hypochromia. From the table it will be seen that, whereas halometric readings show as many as ten instances where macrocytosis is associated with mean corpuscular hæmoglobin lower than 24.77$\gamma\gamma$, Price-Jones method shows this combination in only one instance where the mean red cell diameter is just suspiciously macrocytic. The value of correlation between the 31 halometric readings and the corresponding mean corpuscular hæmoglobin values works out to 0.1244, which is not significant. The same correlation value in the case of Price-Jones readings is 0.7103 which is significant at one per cent

(Concluded at foot of next column)

NOTES ON HUMAN LICE

By MARTIN FRIEDMANN, M.D.
Yercaud (Salem district)

THE present war awakens in most of the doctors who participated in the war of 1914–1918 many reminiscences that are worth communicating, especially such as are of value for the health of the troops.

We know that all the wars of the past, as for instance the Thirty Years' War, the Napoleonic Wars, the Crimean War, the Turco-Russian War, etc., were accompanied by more or less important lousiness of the armies; the same may happen in this war.

In the last war we learnt above all that the body louse (*Pediculus vestimenti*) is not only responsible for annoyances (loss of sleep, etc.) to those infested and for the development of boils, carbuncles, lymphangitis, lymphadenitis, phlegmons, and superficially suppurative processes with all the possible consequences, but also that they play the greatest rôle in the transmission of typhus, trench fever, and relapsing fever, and possibly other diseases as well. It is necessary to know that these diseases are transmitted by the bite of the infected louse, by its crushed body or from its excreta.

Now that we know the great importance of lice, measures for exterminating them should be considered as necessary as the different protective vaccinations and other hygienic precautions. As it seems probable from recent investigations and experiments that body lice and head lice are varieties of the same species, that one can adapt itself to the conditions of the other, and that crossing of the two varieties is possible, the control of lice has to be extended also to the head louse in conditions of warfare.

(Continued from previous column)

value. These results confirm the findings of Napier and Das Gupta.

Summary.—Data reflecting on the accuracy of Eve's halometer have been statistically analysed and it is concluded that the readings of this instrument in anæmia bear no significant relation to the actual average red-cell diameter. It is suggested that, as far as the investigation of anæmia is concerned, the instrument should be 'relegated to the museum'.

Acknowledgment.—I wish to thank Prof. P. C. Mahalanobis for being kind enough to get the mathematical calculations done and Dr. L. E. Napier for permission to draw the Price-Jones curves at the Calcutta School of Tropical Medicine.

REFERENCES

BEAUMONT, G. E., and DODDS, E. C. (1941). *Recent Advances in Medicine.* J. and A. Churchill, Ltd., London.
CHAUDHURI, H. P. (1933). *Indian J. Med. Res.*, **21**, 315.
NAPIER, L. E., and DAS GUPTA, C. R. (1936). *Ibid.*, **23**, 973.

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Unfortunately some of the most important knowledge regarding the biological habits of the lice that we have gained in former wars has already been forgotten. I have seen a recent article condensed from a publication by Prof. J. B. S. Haldane. Here it is said:—

'The best weapon against the lice is a bath in every home' and 'the body louse spends most of its time in our clothes and lays its eggs there.'

Both these sentences contain true and untrue things, as we shall see.

My knowledge is the fruit of observations I have made during the former war and during my stay in Poland, as leader of a delousing station, constructed according to my own plans, which was attached to a big department for skin and venereal diseases.

My observations contrasted both with those which were recorded in pre-war textbooks before 1914 and with what we were mostly taught up to this date. I can only quote a few opinions here:

Hebra, Kaposi, Sack, Darier and others wrote that body lice attach their eggs exclusively to the seams and fibres of the clothes and underclothing. Therapeutically it should be sufficient to change the clothes and to disinfect them.

During the delousing operations—I myself have examined every soldier—I was astonished to find that the body louse can also stay on the human body, the favourite regions being the pubes and the hair of the axillæ, especially in cases of intense pediculosis. Unexpectedly, it was found that it deposits eggs on the body hair too.

The same observations have been made by various other observers, *e.g.*, by Pearls in 1916. But the earliest reports sounded so incredible that Pearls, Wollermann and Buscher proved the correctness of these findings experimentally, and in more recent books these facts are apparently forgotten again; for Stitt (1927), Manson-Bahr (1935) and Jadassohn do not mention them. Only Jadassohn declares that lice are sometimes to be found living on the hair; but he does not mention the deposit of eggs there. In the most recent and attractive monograph about the louse by P. A. Buxton (1939) there is clearly described the whole significance, the biology and control of *Pediculus humanus*. There it is pointed out that the body louse 'generally lays its eggs on the inner surface of under garments, but quite commonly on hairs growing on the trunk'. The memorandum of the Ministry of Health (1940) on the louse finally contains the fact that the nits are cemented to the fibres of clothing or to hairs.

Nevertheless the knowledge of the probable stay of the lice on the human body (*see* Haldane's article, etc.) has not sufficiently spread among medical men.

I believe therefore I am entitled not only to insist on this important fact in my paper, but also on some diagnostic signs, formerly not mentioned and on some questions about therapeutic and control measures.

According to the newer experiences, it must be concluded logically that for a complete delousing the disinfection of the clothes, underclothing, and bedding is not sufficient, because the nits on the body are not killed thereby. Even a bath does not effect complete destruction of the lice; it will only contribute to a reduction in the number of lice, for not all lice are carried off by water. It must be added that water is no killing agent for lice nor can it either detach the nits from the hair, nor destroy them. The chitinous cement with which the female louse fixes the eggs to the fibres of the tissue, or to the hair, is resistant to chemical reagents and is not dissolved in water, differing in this respect from that of the bedbug. If a few nits or a single impregnated female remains, pediculosis must soon recur, for, as we know, every adult female louse lays 8 to 12 eggs daily during her total life-span (4 to 6 weeks). Furthermore, we must consider that one lousy individual will be able to infest others rapidly.

For ridding the body from nits I first tried clipping away the body hair and disinfecting it in a solution of cresol. At weekly intervals I surveyed the deloused men, none of whom had had occasion to leave the hospital and to acquire new lice. But I found a certain number of patients presenting lice again. Therefore I had to conclude that, despite the hair-cutting, several eggs were left. This led me to pursue another course. After the hair cutting I applied on the hairy parts an ointment deleterious to eggs and lice. The most effective is unguentum hydrargyri ammoniati, which was used as long ago as 1748 (Zwinger). It kills the nits with certainty, but their shells remain on the hair for a long time. It is therefore of practical importance to distinguish whether the observed eggs are alive or dead. This question is essential in the struggle, not only against the body louse, but also against the other kinds of lice and even in the destruction of bed-bugs.

It is important not to accept such empty shells as evidence of present infestation; a man carrying such dead or empty eggs will be deloused often and unnecessarily, if the examining person is unable to differentiate between the living egg and the dead.

By what criteria can we test the life or death of the nits?

The living nit presents itself to the naked eye as a tightly-filled, smooth, egg-shaped, pearly-coloured structure with a decided pearl lustre; it has on its top a well-formed lid (operculum). To some extent the shell is transparent, so that the embryo may be distinguished inside it. The dead nit is shrunken, collapsed, dimpled, and discoloured and is without lustre; the empty egg-shells are collapsed, pale-brown and have mostly lost their lids. If the searcher

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is not in a position without or with a pocket-lens to rely upon his visual faculty, he may use his tactile and hearing sense. If he crushes a living nit between his thumb-nails*, or in a pair of pincers, he may feel a marked resistance; if he increases the pressure, the egg will burst with a readily audible noise, a noise which is well known and has often been described in general literature (in antiquity by Herodotus, in the 15th century by Poggio in Italy). In crushing a dead or empty egg there will be neither resistance to pressure nor any bursting noise. But medical men have not used these simple diagnostic signs sufficiently and so far as I know these facts do not appear in medical literature.

For the successful destruction of the parasites in question, the above therapeutic and diagnostic characters should be frequently used and the knowledge of them should be spread as widely as possible.

That a dead body with lice may bring certain dangers is clear for everybody who has had occasion to make suitable observations. Unable to suck blood from the dead, the lice flee from this host; wander away from the dead body until they find a new host whom they attack eagerly.

Another observation I made is with regard to the skill wherewith the lice know how to escape the dangers to their life. The disinfector in which the infected garments, blankets, etc., are exposed to steam or hot air must be free from cracks and the doors of a delousing apparatus have to be closed tightly. If there be any such small gaps through which cool air can enter a great number of lice will be found near those 'draughty' parts in the walls or doors.

*It must be emphasized that it is not advisable to use the thumb-nails, if there is any suspicion of lice being infected with either rickettsia or spirochætes.

Summary

1. It is not as well known as it should be that the body louse may attach its eggs to the body hair of its host.

2. Delousing will only be effective if in addition to disinfecting the clothes the hair is treated too. A useful ointment for killing lice and eggs is unguentum hydrargyri ammoniati.

3. By crushing the nits it is possible to determine whether they are alive or not.

4. A dead body with lice may bring special dangers.

5. The delousing apparatus must be free from cracks and gaps.

REFERENCES

BUXTON, P. A. (1939) .. *The Louse*. Edward Arnold and Co., London.

MANSON-BAHR, P. (1935). *Manson's Tropical Diseases*. Cassell and Co., Ltd., London.

MINISTRY OF HEALTH, LONDON (1940). *Memorandum on the Louse and how to deal with it*. Memo 230/Med., His Majesty's Stationery Office, London.

STITT, E. R. (1927) .. *Practical Bacteriology, Blood Work and Animal Parasitology*. H. K. Lewis and Co., Ltd., London.

A Mirror of Hospital Practice

PERSISTENCE OF DIARRHŒA IN ENTERIC FEVER

By SUDHANSHU MOHAN DAS, M.B.

Sylhet

Case 1.—A boy, aged 16 years, in the latter part of the 4th week of fever in 1931, was running a remittent type of temperature rising up to 103°F. with flatulence and diarrhœa. I failed to control the diarrhœa with the usual intestinal antiseptics and astringents. Keeping in view the possibility of secondary infection I gave the patient one injection of 10 c.cm. anti-streptococcal serum. The diarrhœa instantly stopped and the flatulence abated gradually. His bowels afterwards had to be opened every other day with glycerine enema. Fever gradually came down to normal and he recovered.

Case 2.—A man, 45 years old, was under my treatment from the beginning for enteric fever in 1935. In the 5th week, the fever came down to normal in the morning, rising a degree or two towards evening. But the diarrhœa, which gradually developed in the middle of the course of the fever, persisted in spite of usual treatment for its control. On examining the stool, I found many *Entamœba histolytica* cysts. I then washed out the bowel with 1 per cent silver nitrate solution. The first motion after the wash contained some blood. But the diarrhœa was readily controlled and he made an uneventful recovery.

Case 3.—A girl, 9 years old, was under my treatment from the beginning for enteric fever in 1939. In the third week the girl began to pass 10 to 12 stools a day with mucus and blood. The character of the stool was unlike that due to hæmorrhage in enteric fever and resembled more that due to dysentery. I examined the stool which contained pus cells and macrophage cells. I gave her a course of bacteriophage for two days but the motions became more frequent. I then examined the stool again and detected one motile *E. histolytica*. I at once injected half a grain of emetine hydrochloride, the character of the stool improved and the frequency lessened. In two or three days she was passing one normal stool a day. Gradually the fever came down and she recovered.

Case 4.—A man, 24 years old, was treated from the beginning for enteric fever in 1941. Towards the latter part of the second week he developed diarrhœa. This complication resisted all the usual intestinal antiseptics and astringents. The frequency of the stool was rather on the increase, coming up to 22 motions in 24 hours. On examining the stools I found pus cells, macrophage cells, one motile *E. histolytica* and a few cysts. Half a grain of emetine hydrochloride was at once injected and a dose of Dover's powder given. The motions came down to 7 in 24 hours. Emetine hydrochloride in the same dose was administered every other day and in three days the diarrhœa totally stopped and he was passing one normal stool a day. In this case the patient did not complain of pain or any other

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symptoms of dysentery, the stools also were free from blood and mucus.

Discussion

In cases of stubborn diarrhœa in enteric fever, where the usual intestinal antiseptics and astringents fail, we should think of amœbiasis. There may be complete absence of pain, tenesmus or other symptoms of dysentery.

As regards case 1, possibly secondary infection was keeping up the diarrhœa. I did not examine the stool in that case.

ENTERIC TYMPANITES SIMULATING ACUTE INTESTINAL OBSTRUCTION

By HUKAM CHANDRA, M.B., B.S., P.C.M.S.

Assistant Surgeon, In-Charge, Civil Hospital, Kahuta District, Rawalpindi, Punjab

A MOHAMMEDAN male was referred as a case of acute intestinal obstruction requiring immediate operation, by a medical officer of a rural dispensary in the district, who had seen the patient a few hours earlier.

History of present illness.—Three days previously the patient had a sudden attack of vomiting and purging followed the next day by flatulence and constipation. The abdominal distension went on increasing and the constipation became obstinate without any flatus being passed. There was, however, no more vomiting, though thirst and nausea were prominent complaints. Enemata, administered at the rural dispensary, had no effect and an immediate operation was advised by the medical attendant.

Previous history.—The patient, an agriculturist, had always taken ordinary lacto-vegetarian diet with an occasional allowance of meat. The bowels had generally kept regular and he gave no history of any previous abdominal complaints. He denied any indiscretion in diet preceding the present acute trouble.

Physical examination.—The facial expression was not characteristic of 'acute abdomen'. Cheeks were flushed, lips and mouth dry, tongue coated with dirty white fur, its tip and margins having a raw appearance. The abdomen was greatly distended with the walls held somewhat rigid. Spleen and liver were not palpable and intestinal movements neither visible nor heard on auscultation. Heart sounds were feeble, pulse 90 per minute, moderately full but easily compressible, respiration rather hurried being 30 per minute and a few rhonchi were present at the pulmonary bases. Temperature 100.5°F., urine scanty and high-coloured with no abnormal constituent. No rash of any kind was visible on the body surface. There was no appreciable wasting, no mental symptoms, and the general condition was quite satisfactory.

The above findings made me sceptical as to the diagnosis of intestinal obstruction and further questioning brought out the fact that the patient had really not been keeping 'quite well' for about ten days immediately preceding the attack of diarrhœa. He had felt disinclined to go about his usual work though he had been doing it. Frontal headache, a bad taste in the mouth, diminished appetite, a tendency to constipation and slight fullness of the abdomen with gurgling at the time of defæcation were experienced during this period. He agreed to the suggestion that these symptoms might have been due to fever.

A provisional diagnosis of typhoid fever was made and the patient admitted into the hospital. The idea of surgical interference was given up for the time being and a conservative line of treatment adopted. Calomel in fractional doses by mouth, enemata of weak potassium permanganate lotion with added turpentine oil, hypodermic injections of pituitrine and atropine, and turpentine stupes to the abdomen relieved the retching and thirst, and, although no motion nor wind was passed, the patient felt more comfortable, probably from relaxation of the abdominal walls. Insertion of a flatus tube in the rectum did not prove of any value. In the evening I called the civil surgeon to see the case. He agreed with my diagnosis and advised continuance of the treatment till the next morning. The patient was now put on a mixture containing ammonium chloride grains 10, acid hydrochloric dilute minims 10, liquor strychnine hydrochloride minims 5, liquor hydrargyri perchloridi minims 20 and peppermint water one ounce, four-hourly, and fomentations to the abdomen were continued. Maximum temperature recorded in the evening was 102°F. The general condition gave no cause for anxiety.

At about 4 a.m. the patient passed a lot of flatus *per rectum* followed by two loose motions immediately afterwards and the abdominal distension was considerably relieved. On the next morning the abdomen became absolutely lax, the temperature gradually subsided and general condition distinctly improved. Two nights later the patient had another sudden attack of diarrhœa and passed several loose motions accompanied with tenesmus but there was neither nausea nor vomiting. This was controlled by withholding all food and it was not followed by any abdominal discomfort or tympany. The acid mixture was continued and other measures usually necessary for the successful management of an enteric patient adopted, as required. The temperature declined steadily and became 98°F. three days later with an evening rise up to 99.2°F. Two days later, it did not go beyond 98°F. By this time the patient who had been insisting on returning to his village-home ever since the relief of the abdominal condition could no longer be persuaded to stay in the hospital. There was, he asserted, nothing wrong with him now and that he must go back. Necessary instructions regarding rest in bed and diet were given though it is doubtful whether he carried these into practice. A few days later I heard that he was well and had returned to work.

Comment

Although no blood examination was made to confirm the diagnosis of typhoid fever, there was little doubt about it on clinical grounds. The history elicited from the patient and his physical examination on admission were sufficient to form such a presumption, while the subsequent course of the disease, and the characteristic behaviour of the temperature in particular, confirmed this opinion. The chief point sought to be emphasized is the importance of taking a detailed history and making a thorough physical examination of cases with 'acute abdomen' to avoid the catastrophe of undue surgical interference based on hasty judgment.

I am thankful to Doctor Sher Singh, P.C.M.S., Civil Surgeon, Jhang, for his advice in treatment of the patient and permission to report the case.

CONTINUOUS ERUCTATIONS TREATED BY EMETINE HYDROCHLORIDE

By K. L. KOTHARY, M.B., B.S.

Demonstrator in Bacteriology, Grant Medical College, Bombay

A NERVOUS young man of temperate habits, aged 27, consulted me on account of continuous eructations of two months' duration. He said that one of his cousins also suffered from the same complaint for one month.

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History of influenza five years ago and dysentery three months ago.

Physical examination showed nothing abnormal except tenderness on deep pressure in the left iliac fossa. The urine and the stool showed nothing abnormal. He had taken all sorts of carminative drugs from various doctors, but with no improvement.

I concluded that the condition had a neurotic basis and referred him to a psycho-analyst. Before he left me, I asked him to send his cousin who had the same trouble.

His cousin, a man of 33, very intelligent and far from being a neurotic, told me that they both had an attack of dysentery three months ago and only after that did they have this trouble. Neither of them had taken any treatment for their dysentery.

Physical examination—nothing abnormal; urine—clear. His stool showed *Entamœba histolytica* cysts and I started intramuscular injection of emetine hydrochloride (P. D.) gr. 1 daily. After 3 grains, his eructations stopped altogether. I finished the course of emetine and sent him home cured, asking him to send his cousin. Emetine was started on this man also and after one injection the eructations stopped. But the whole course was given to him. After one month both were seen again and they had remained well.

Summary.—Two cases of continuous eructations having a history of amœbic dysentery were treated with emetine hydrochloride injections. In one case 3 grains and in another 1 grain cured them.

SIAMESE TWINS

By S. PONNIAH, L.C.P. & S. (Bom.)

Assistant Medical Officer, Scudder Memorial Hospital, Ranipet, N. Arcot, S. India

A WOMAN, aged 40, had already had four children and this was the fifth pregnancy. She was well nourished. Her pulse was 120, respiration 30, blood pressure 170/90, and temperature 98.8°F. She was very œdematous—her legs, abdomen, and face were extremely swollen. Labour pains had started 18 hours previously, pains were strong and membranes had not yet ruptured. I advised her to come at once to the hospital, which she did. About one hour after admission, membranes ruptured and labour progressed slowly because of the weakened condition of the patient. The diagnosis of

twins was made and since progress was very slow and the cervix was completely dilated and the head was presenting in the L.O.A. position, I decided to perform a forceps delivery at once. The forceps were applied and the head delivered. But on removing the forceps, the head was pulled again into the vagina in an abnormal manner. I again pulled the head down, and having the nurse who was assisting me to hold it, I delivered the shoulders and arms. Following the delivery of the head and arms, I made an examination and found a connection between this baby and a second one which was still *in utero*. I then delivered the first baby entirely and at the same time feeling the legs of the second in the vagina, I grasped them and extracted the second baby by breech with some difficulty. The bodies were found to be connected face to face from a point above the ensiform process to a point one inch below the umbilicus. This connection was 3½ inches long by 2½ inches broad at the upper end and 1½ inches broad at the lower end. The connection was centrally situated over the chest of both babies but was placed to one side of the umbilicus on the abdomen of both. The umbilicus of each was still not closed completely and the umbilical cord to each, entered this unclosed opening and was unfortunately not investigated deeper. Each small umbilical cord ran for two inches separately and then they were united into one, which connected with one placenta. The babies were still-born and of the female sex. The intestines protruded through the unclosed umbilical openings as the delivery was being done. Intestines were evidently common to both for, when one loop was pulled down and lengthened, the loop protruding through the other umbilicus was shortened. The total weight was 11½ pounds. They were full term and well formed in every other way. The heads, arms and legs were normal. During delivery the mother's œdematous perineum was lacerated and required suturing. The mother did well after delivery and suffered very little inconvenience. This was a specimen which we should have liked to keep as a museum specimen but the relatives refused to allow this. In fact further detailed examination was impossible as the relatives insisted on taking it away.

SUPPURATION OF THE MIDDLE EAR TREATED WITH UREA SOLUTION

By DINA NATH VAIDYA, L.M.P., S.S., M.R.SAN.I.

Medical Officer, The Coleyana Estate Limited, Okara

A HINDU woman, aged 30 years, came to the hospital with severe pain in the ear, temperature 102.4°F., and headache. The middle and external ear were swollen, red, painful and tender. The patient could not lie on the affected side and was in a grave condition. She was given opening medicine, fever mixture and hot fomentation, and the swelling was painted with tincture of iodine and ichthyol, and bandaged. Next day she came back but with very little relief; she remained sleepless and restless the whole night, crying with pain and tenderness. This hospital being only an outdoor one I could not keep the patient in the hospital but I detained the patient and told her that she would only be allowed to go when there was no pain. She was kept lying down and 2 c.cm. novocain mixed with adrenalin solution was dropped in the ear, after clearing the ear with hydrogen peroxide. She remained in the hospital for three hours in the morning, and during this period novocain was dropped in four times, when she was completely relieved and was discharged from the hospital. In the evening she came again with the same complaint of pain, but not so severe. The same novocain treatment was repeated three times and she left the hospital without any pain. She slept well, bowels moved and there was no fever or headache. After a few days she again attended the hospital with discharge of pus from the ear, but there was no pain or swelling. The ear was thoroughly cleaned with hydrogen peroxide, and pure urea solution was dropped in the ear. This treatment was continued for about ten days and the pus disappeared and the ear was quite healthy.

Heretofore I have never treated cases of middle-ear suppuration with urea. This case

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has encouraged me to adopt the urea solution treatment in suppuration of the middle ear. I have used concentrated solution in all sorts of open wounds, ulcers, etc., and the foul smell and pus disappear quite satisfactorily in a very short time. I have tried it in all surgical cases and only recently I have cured two mammary abscesses which were very bad and discharging foul pus, with urea treatment. Urea is a good, harmless and quick healer and may be used in all surgical cases, wounds, ulcers, etc.

A CASE OF MILD HYPOPITUITARISM

By OWEN BERKELEY-HILL
LIEUTENANT-COLONEL, I.M.S. (Retd.)
Ranchi, Bihar

X. Y., a Mohammedan from Chota Nagpur, aged 18, consulted me early this year in respect to his sexual potency, in view of his impending marriage. He complained of an inability to obtain a full erection of the penis, no matter how greatly excited he was by desire. On the other hand, he had noticed that his penis was often fully erect on awakening from sleep. He told me that he had had sexual intercourse with two Indian women, to one of whom he believed he had given a child. He admitted to masturbation since the age of 13 as well as to competing with other boys as to who could void urine the highest. Masturbation caused his penis to enlarge and stiffen but never to produce more than a semi-erection. He said he was prone to get a quick semi-erection of the penis when looking at a pretty girl but further investigation of the patient's case leads me to suppose this statement was a piece of wishful thinking, for, like most semi-impotent males, he did his best to ignore his condition and compensate his inferiority feeling by trying to believe to possess a super-potency.

His weight was 112 pounds, height 5 feet 5 inches. His musculature was extremely well developed, except his pectoral, gastrocnemius and triceps muscles. That a powerful youth who had done much physical culture should have such exceedingly poor pectoral muscles was notable. Furthermore, his nipples were infantile. His chest measured 33/35½ inches, waist 26 inches, biceps (in contraction) 12 inches, calves 12 inches. His whole body was without hair except for pubic hair which was more feminine than masculine in arrangement. He had a few hairs on his upper lip. His penis was rather small but his testicles were very small, almost infantile. He said he very rarely had a seminal emission during sleep but attributed this to the fact that his semen was 'too thick to pass out'. Subsequent observation led to the discovery that his semen was rather watery for a young man of his age and build. He stated that as a small child (about 7 years old) he had suffered from several attacks of intense abdominal cramps from each of which he was not expected to survive, otherwise he had had no serious illness. He had always been a naughty and mischievous boy for which he was frequently severely thrashed by his father. He is the youngest of three sons. His father is a powerful man and so is the eldest son while the second son is poorly developed. Both the patient and his eldest brother have been much addicted to physical culture and sports of all kinds. He does not drink or smoke. The systolic blood pressure was 120 mm.; diastolic 70 mm.; pulse pressure 50 mm. According to observations on the blood pressure of healthy boys between the ages of 15 and 19 years, lowest systolic pressure is 105—medium 117—highest 129; lowest diastolic pressure 73—medium 77—highest 81. Hence the patient's systolic pressure tends to be a little high, while his diastolic pressure is rather lower than normal.

The psychological side of the clinical picture revealed a would-be 'Don Juan' temperament. His attitude towards women was characterized by a certain degree of intransigence, cultivated, no doubt, with the view of impressing women with his virility. He was notorious among his friends and acquaintances for his fondness for uttering obscenities. As a matter of fact most, if not all, girls and women disliked him. Of the art of love making, he was completely ignorant. But the most striking feature in his temperament was an immense narcissism. He asked me if I knew of a photographer who would take photographs of him naked. I directed him to a studio in Calcutta. It so happened that the proprietor of the studio to which I directed him had once been a physical culturist. He detected at once his client's poor pectoral development and advised him to take six months' intensive physical culture and then present himself for photographing. This advice dealt a staggering blow to my patient's narcissism. He begged to be photographed. To satisfy him, the photographer took him in six poses.

The physical characteristics of the case led me to suppose there was some pituitary defect so I referred the case to Lieut.-Colonel J. A. Shorten, I.M.S. (Retd.), who reported as follows:—

'*Part examined—skull lateral*

X-ray findings.—The sella turcica is shallow and the clinoid processes are poorly developed. The measurements are 10 mm. by 6 mm. instead of 16 mm. by 9 mm. which are the average measurements given by Cushing.

In addition to this, note the almost complete absence of frontal sinuses and the small size of the sphenoidal sinuses.

All these signs point to hypopituitarism of a mild type'.

On the psychological side, I discussed the case with Dr. Girendrashekar Bose of Calcutta, the eminent psycho-analyst. He considered that a strong 'castration complex' was operating and advised a course of psycho-analysis.

It was, of course, obvious that any man who could only obtain a semi-erection would never be able to penetrate the hymen of a virgin, especially if the girl knew nothing of the art of love, which could hardly be expected in an ignorant Mohammedan girl of sixteen years of age who was strictly *purdahnashin*. I watched the approach of the youth's marriage with the greatest apprehension.

At the first intercourse, the youth, filled with a blinding desire to be a complete 'he-man' with his bride, fell upon her with a partially-erect penis and can hardly have done more than ram her in her *fossa navicularis*, thereby causing her fright, embarrassment and pain. He repeated this performance on several occasions but caused the girl so much distress that one night she screamed for her relatives to turn her husband out of the house. This they did and for several months the girl refused even to speak to her husband, far less allow him to have intercourse with her.

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If the girl could have been told that her husband is partially impotent, so that for his sake and more especially her own she must, at first, at any rate, only permit him to try in what Van de Velde in his book *Ideal Marriage* calls the 'Attitude of Extension', that is, after the penetration of the penis, the woman, who is lying on her back, closes her thighs and stretches out her legs to their full extent. This attitude is especially successful when the male organ cannot attain full erection. For the man, this attitude has the further advantage of increased stimulation of the penile shaft in a somewhat crude but effective way. The extended attitude of the woman is made more complete by keeping the upper part of her body quite flat and placing a firm hard pillow under her buttocks. Had it been possible to give either bride or bridegroom this information, the sequence might have been averted, but every reader of the *Indian Medical Gazette* will know that the pruriency and false modesty of an uneducated Indian girl is so intense that to try to put across this advice is impossible. To give it to the bridegroom, who entertained great notions of his sexual prowess, in spite of the defective erection which he was feign to ignore, would probably have added to his impotency.

The implications of the above clinical history are, I think, very considerable. They are not only of medical interest, which nowadays includes psychological, but of sociological importance. So long as the importance of sexual knowledge continues to be rather less understood among Indians than it is among most Britishers, these disastrous situations are likely to appear and re-appear *ad infinitum*.

A LIVER ABSCESS BURSTING INTO THE PERITONEAL CAVITY WITH SIGNS OF INTESTINAL OBSTRUCTION

By P. N. SINHA BARMA, L.M.F.
Medical Officer, Sendra Colliery
R. ROY, M.B.
Medical Officer, Mudidih Hospital
and
T. BHATTACHARYA, M.B.
Pathologist, Messrs. Bird and Co., Sijua

C. B., miner, aged about 40 years, came to the Sendra dispensary on the night of 28th November, 1941, with the following complaints:—

(1) Swelling of the abdomen—3 days.
(2) Inability to pass flatus and stools—3 days.
(3) Pain in abdomen, especially the upper part—3 days.
(4) Vomiting—3 days ago; none since then.

The patient was emaciated with a distended abdomen. Answered questions with difficulty. Coughing at intervals with slight expectoration. Œdema of the legs and abdominal wall was present and the patient was markedly anæmic. No sign of jaundice could be detected. The breathing was thoracic in type although a slight movement of the upper part of the abdominal wall was noticeable. There was slight rigidity of the abdominal wall and signs of free fluid in the peritoneum were present. No peristalsis or distended coils of intestine were visible. The abdomen was tender all over. The liver was enlarged and tender. The spleen was not palpable. No distended veins could be seen on the abdominal wall.

Temperature 99°F.; pulse rate 130 per minute; respiration 35 per minute.

The patient was given an enema and a small quantity of liquid stool with blood and mucus was obtained. He was given an injection of atropine sulphate to ease the pain and was sent to the Mudidih hospital.

Here the patient's relatives were questioned and a history of chronic dysentery for the last 3 months was elicited. No rigidity was detected at this time. The soft abdomen without any rigidity and absence of vomiting was a feature that could not be made to fit in with the diagnosis of acute abdominal catastrophy.

The stool was examined after obtaining a small quantity through a thick rubber tube and was found to be teeming with vegetative forms of *Entamœba histolytica*.

The condition of the patient was very low hence an injection of strychnine sulphate, gr. 1/32 with atropine sulphate gr. 1/100, was given and glucose 25 per cent (25 c.cm. intravenously). Later an injection of emetine hydrochloride gr. ¾ was given.

The patient died 4 hours after reaching the hospital.

A *post-mortem* examination was held on the following day. On opening the abdomen the coils of intestine were found distended, congested and matted together with plastic exudate. The whole of the peritoneal cavity was full of pus. The greater omentum was adherent to the under surface of the liver. On gently separating this, a big abscess was found protruding at the under surface of the right lobe of the liver with the gall bladder at its left border. The abscess was leaking towards its posterior part. The liver was removed and its upper surface showed a thin layer of purulent exudate situated between the two layers of peritoneum. The lesser sac was full of pus.

On opening the large intestine a large number of typical amœbic ulcers were seen.

The pus in the peritoneal cavity showed pus cells, mostly large mononuclear and degenerating liver cells, but no organisms.

Discussion

The presenting symptoms of this case were those of intestinal obstruction, *e.g.*, inability to pass fæces and flatus with pain in abdomen and gradual distention. The absence of rigidity was against any inflammatory condition of the peritoneum and we thought it to be a case of amœbic dysentery with hepatitis and possibly abscess. We could not account for the fluid in the peritoneal cavity and it was only the *post-mortem* finding of pus which showed no pyogenic organisms with degenerating liver cells in it that explained the whole picture, except the absence of rigidity. The signs of intestinal obstruction were due to paralytic ileus following the involvement of the peritoneum.

Our thanks are due to our C. M. O., Dr. R. J. Singha, Mr. S. F. Tarlton, the Chief Mining Engineer, Messrs. Bird and Heilgers, and Mr. J. Leggate, Manager, Sendra Colliery, for permission to publish this case.

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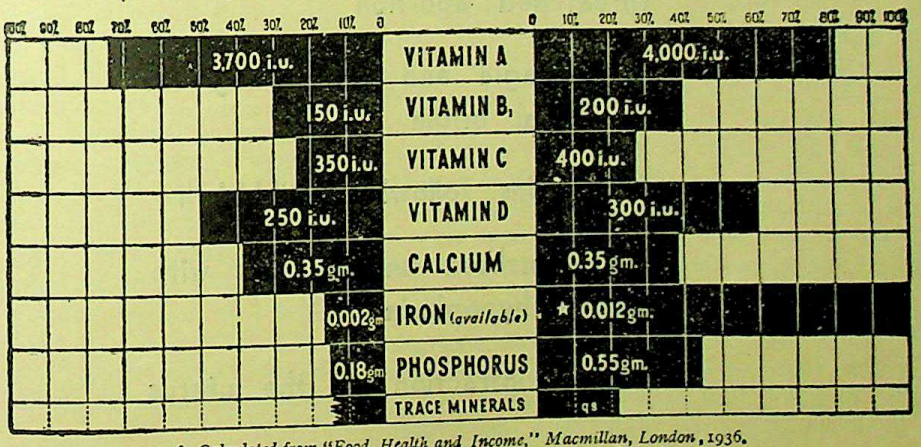

† *Calculated from "Food, Health and Income," Macmillan, London, 1936. J. Soc. Chem. Ind. June, 1937. J. Soc. Chem. Ind. Jan., 1940.*

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Indian Medical Gazette

MARCH

HEALTH OF THE INDUSTRIAL WORKER

THE war has inaugurated many changes in our social and economic lives which we hope will not be allowed to revert to their previous unsatisfactory state after the war is over. Industry, though it has not, except in a few instances, become nationalized, has nevertheless come into the national limelight and it has to account, not only to its shareholders but to the nation, for its failures and its successes. In the past, shareholders became disturbed and tended to ask difficult questions only in the face of failure; with certain notable exceptions in advanced western countries, they were content to pocket the profits, in the event of success; but now that industry is being subjected to so much outside scrutiny, a change has taken place and two questions are being asked :—Is the success the maximum that could be expected, and at whose expense is it being achieved? In both these cases the question of the health of the worker arises.

The aims of industrial hygiene can be placed under two headings, (*i*) the prevention of the immediate ill-effects of certain occupations on the industrial worker, and (*ii*) the maintenance of the mental and physical health of the worker at its highest level, so that his or her output is maximal. In each case there is advantage to both the worker and the industrialist, but in the former it is mainly the worker, saved from crippling disabilities, whose interest is served, and only indirectly that of the employer who would otherwise lose his trained worker and may have to compensate him; in the second case, the advantage goes mainly to the employer who gets the benefit of a greater output and better work, and only indirectly to the worker whose health is often maintained at a higher standard than that of the general population from which he comes.

The serious disabilities that some occupational groups suffer from, such as pneumoconiosis, lead poisoning, and the industrial dermatoses, have attracted the attention of the public and, in some instances, have eventually stirred the conscience of the industrialist, in others his interest has been forced by workmen's compensation acts. In most western countries the bill that has to be paid annually, for working time lost, medical care, and compensation, is so large—a recent computation in the United States placed it at 660 million dollars—that naturally employers are beginning to pay very special attention to industrial hygiene, and are inaugurating and supporting investigations into the preventable causes of both industrial accidents and industrial disease.

Industrial medicine originated with the present industrial era, for all practical purposes —though Hippocrates described silicosis—but it has received such a very great impetus during the last decade that it is often looked upon as a new branch of medical science, and within the last few years a formidable literature on this subject has begun to appear.

A recent important publication, *Industrial Hygiene,** by various American writers deals with the subjects from an administrative as well as a medical point of view, but it is confined almost exclusively to conditions as they exist in the United States. From Great Britain, Collier's *Outlines of Industrial Medical Practice*†, whilst being a comprehensive survey and including chapters on the medical aspects of occupational diseases, tends to emphasize the legal provisions and the regulations that have to be complied with in that country. *In Health in Relation to Occupation*‡, Dr. H. M. Vernon approaches the subject in a more general way, commencing with the effects of heredity, nutrition, and the economic factor, and later dealing with mortality and sickness in different occupational groups.

In these and most other pre-war publications —pre-war in outlook if not in actual date of appearance—what we considered above as the first aim of industrial hygiene, namely the prevention of general and specific illness amongst workers, mainly for the worker's sake, is the point of view that is given primary consideration. In this 'all-out' war, the second aim, namely the maintenance of a high level of physical and mental fitness in the worker for the sake of the work that he does, so that his output may be maximal, is now becoming the more prominent consideration. This aim is a higher one—though it may be less personal and might be described as soulless; its object is to keep the worker not only on his feet but at the top of his form, and it must therefore be comprehensive.

The seeds of this movement were sown during the last war with the formation of the Health of Munition Workers Committee which was followed by the Industrial Fatigue Research Board and eventually by the foundation of the National Institute of Industrial Psychology. During the intervening years, the growth has been slow and at times barely perceptible, but war again gave the necessary stimulus and some of the fruits are now being applied with

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*Health in Relation to Occupation. By H. M. Vernon, M.A., M.D., 1939. Oxford University Press, London. Humphrey Milford. Pp. viii *plus* 355. Price, 15*s*. Illustrated. Obtainable from Oxford University Press, Bombay and Calcutta.

†Industrial Hygiene. By various authors. Edited by A. J. Lanza, M.D., and Jacob A. Goldberg, M.A., Ph.D. 1939. Oxford University Press, London and New York. Pp. xvi *plus* 743. Illustrated. Price, 56*s*. Obtainable from Oxford University Press, Bombay and Calcutta.

‡Outlines of Industrial Medical Practice. By Howard E. Collier, M.D. (Edin.), Ch.B. 1940. Edward Arnold and Company, London. Pp. vii *plus* 440. Price, 21*s*.

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considerable advantage to munitions output in England.

A recent publication, *Health and Efficiency of Munition Workers**, again by Dr. H. M. Vernon, deals mainly with this aspect of industrial hygiene and the writer applies experiences of the last war to the present one. His principal chapters are on hours of work, rest spells, the shift system, etc., and in short on how one can get the best out of the human machine without breaking it down.

In India, we have scarcely made a beginning. Some larger industrial concerns have their own medical staffs, but these are mainly concerned with medical relief and ordinary public health measures of prevention, such as anti-malarial work. A few of the large industrial associations, *e.g.*, the tea, jute and mining associations, have generously endowed research on diseases from which their employees are liable to suffer, but the factory worker, *in* the factory, has seldom been the subject of any direct investigation.

The Report of the Royal Commission on Labour in India drew attention to the necessity for industry in India being conducted as efficiently as possible. The British Industrial Health Research Board and its researches were cited to indicate the importance of scientifically designed investigations to enable the various branches of industry to adopt improvements in practice which would lead to increased efficiency. The Commission recommended that comparable research in India was called for. This recommendation, made in 1931, has not been implemented and in 1942 the developments arising out of the war make the need even more urgent.

The headings under which research has been carried out in Great Britain, as indicated in the last annual report of the Industrial Health Research Board, show the wide fields deemed necessary for investigation, covering, as the headings do, hours of labour, environmental conditions such as lighting, ventilation, etc., methods of work; vocational suitability, and industrial sickness including labour wastage and occupational disease. Other industrialized countries are conducting research on similar comprehensive lines, but as yet there are no signs of any such activities in India.

This country is making a serious mistake in failing to include the safeguarding of the health of the workers in its already significant plans for not only expanding industries but for training cadres of technical workers. While the framers of this new industrial machine, and the Government of India in particular, must be held eventually responsible for any failure to correct this defect in the organization, the initiative lies with the medical profession and more especially the highly placed expert medical advisers to the Government—to urge the necessity for specific study of problems of industrial health and prevention of disease in relation to the special social and climatic conditions of India. The first step appears to be the constitution immediately of a small committee composed of technically competent persons, without regard for seniority, representing physiological hygiene, medical engineering and Indian medical administration. The recommendations of this committee should constitute the point of departure for initiating as quickly as possible steps which may be inaugurated to conserve and increase the efficiency of India's growing industrial war effort.

No committees and no official organizations will be of any real avail unless there exists in the minds of the medical profession in India a growing appreciation of the importance of industrial hygiene, not only as a war measure, but as necessary to complete the health organization in a country that is undergoing rapid industrialization.

* The Health and Efficiency of Munition Workers. By H. M. Vernon, M.A., M.D. 1940. Oxford University Press, London. Humphrey Milford. Pp. 138. Illustrated. Price, 8*s.* 6*d.* Obtainable from Oxford University Press, Bombay and Calcutta.

CORRIGENDUM

INFANTILE BERI-BERI

In the February number, page 97, column 1, the 14th line of the second paragraph should read 'within 24 to 48 hours'.

Special Articles

THE ASSESSMENT OF VITAMIN NUTRITION

By N. C. DATTA

Department of Physiology, Grant Medical College, Bombay

IT is only recently that many inquiries into the state of nutrition of large groups of people are being made. Any investigation on the assessment of nutrition, either in nutritional research or in the clinical laboratory, emphasizes the need of reliable and practical methods for detecting the presence of partial or latent deficiencies in human subjects. Chemical, physical, and biological methods have been elaborated during the past few years for the assay of certain vitamins in body fluids. Chemical and optical methods offer the advantage of speed and reproducibility; the biological methods afford the most reliable means of estimating the physiological activity of the vitamins. Many of the methods that have been used as a clinical test in assessing the vitamin nutrition are still in the experimental stage. With the rapid extension of our knowledge, it may soon be possible to have simple reliable tests which will meet with universal approval. It is also expected that, with further development of the clinical laboratory

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determination of state of vitamin nutrition, more will be learned of the effect of vitamin deficiency on bodily function. Then, many cases of ill-health which are now considered to be of obscure origin, may receive proper diagnosis and appropriate treatment.

Vitamin A

The first chemical method developed for the assay of vitamin in body fluids was based on the observation by Carr and Price in 1926, of a blue colour which develops when vitamin A reacts with antimony trichloride in chloroform solution. The intensity of the blue colour is measured by means of an instrument called the Lovibond tintometer. The earlier results of analysis on the vitamin-A content of blood are reported to be unreliable because of the inadequate methods of extraction and the separation of interfering substances. In 1935, van Eekelen and Emmerie introduced an improvement by way of heating the serum with potassium hydroxide before extracting it. Dann and Evelyn (1938) used a photo-electric colorimeter which permits the reading of the blue colour at its maximum so that the error due to waxing and waning of the colour could be eliminated. Lindqvist (1938) reported wide variations in the vitamin-A value of blood in apparently normal subjects. The significance of blood determination of vitamin A yet remains to be solved.

Dark adaptation as a test for vitamin-A deficiency.—The symptom of vitamin-A deficiency which has been most studied is hemeralopia or night-blindness. The relationship of diet to night-blindness was recognized by a number of investigators, but Bloch (1921) clearly stated that night-blindness was due to a deficiency of vitamin A. A new light was thrown on the subject when Fridericia and Holm (1925) showed that vitamin A plays an important part in the reversible conversion of visual purple into its leuco-derivative. The exact rôle of vitamin A in rod vision and its relation to rhodopsin or visual purple was first elucidated by Wald (1938). He showed that rhodopsin, which is concerned with the reception by the eye, is bleached by light, and the yellow pigment *retinene* is formed. Some of the retinene is rapidly converted to rhodopsin in the dark but some is converted to vitamin A. The vitamin A so formed is then slowly reconverted to rhodopsin. The rate of regeneration seems to depend on the concentration of vitamin A in the retina. It is natural to expect, therefore, that the delayed regeneration of visual purple would be one of the earliest signs of vitamin deficiency.

Numerous attempts have been made to use the dark-adaptation test as a measure of vitamin-A deficiency. The basis of dark-adaptation test is the observation that the ability of a person deficient in vitamin A to see a dimly illuminated object in a dark room is diminished or that, after he has been exposed for a certain period to bright light, the rate of his recovery of that power is delayed. The method was first put to test by Jeans and Zentmire in 1934, by means of the Birch-Hirschfeld photometer. The extensive studies by Hecht (1937) of dark adaptation furnish the basis for clinical application. The results, however, appear to be somewhat conflicting. Harris and Abbasy (1939) pointed out that most of the discrepancies in the correlation of dark adaptation with vitamin-A deficiency have been by those using the biphotometer. In view of variable results obtained by different workers, it is stressed that dark-adaptation test is only capable of detecting deficiency and not of assessing with accuracy the different level of normality. Hecht (1937) has shown that rods and cones differ in their dark adaptation. He pointed out the desirability of testing a known segment of the retina because of the difference in the distribution of rods and cones.

Night-blindness occurring in vitamin-A deficiency is apparently due to a failure of regeneration of visual purple in the absence of vitamin A. There may be a number of other causes of night-blindness in addition to deficiency of vitamin A. Sydenstricker and his associates (1940) reported that 'dimness of vision is a common symptom of riboflavin deficiency in human beings'. Kimble and Gordon (1939) reported that individuals who failed to improve their dark adaptation with vitamin-A supplements were successfully restored with the addition of riboflavin to their diet. In those who failed to improve with riboflavin, ascorbic acid supplement produced satisfactory improvement. It seems probable that many of the discrepancies concerning the relation of vitamin A and dark adaptation are due to the varying techniques and also to the influence of other vitamins on dark adaptation. Although the elimination of the influence of unrelated ocular conditions is essential for accurate assessment of vitamin-A deficiency, the dark-adaptation test, with all its limitations, is considered to be one of considerable practical value in assessing the state of vitamin-A nutrition.

Vitamin C

Until 1932, biological methods were the only methods available for the estimation of vitamin C. In 1932, Tillmans *et al.* reported that vitamin C is a reducing substance and developed a chemical procedure for the determination of vitamin C, based on the quantitative reduction of an oxidation-reduction indicator 2 : 6 dichlorophenol-indophenol. The reaction is not specific for vitamin C, since body fluids contain other substances which also cause reduction of the dye indicator. In blood, we have other reducing substances, which are present only in small amount and, therefore, cause the reduction slowly. It has also been reported that a large part of the reducing capacity of the urine is due to substances other than vitamin C. Mindlin and Butler (1938) described a method in which they used a photo-electric colorimeter to

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eliminate the influence of other interfering substances. Recently, metaphosphoric acid has been used successfully for the extraction of ascorbic acid. By this means ascorbic acid oxidase activity and the interference of copper are prevented.

Urinary excretion of vitamin C.—Vitamin C is excreted in the urine. The urinary excretion of vitamin C has been taken as a measure of vitamin-C deficiency. A normal adult not suffering from latent scurvy should excrete about 15 mg. of ascorbic acid per day. Excretion of less than 10 mg. may be taken as an indication of latent scurvy. The total excretion of ascorbic acid in the urine is determined by titration of a known volume of the urine with standard solution of the dye; the reaction of the urine being adjusted to pH 2 to 3, in order to eliminate the effect of other reducing substances. According to Harris and Ray, the amount of vitamin C in the urine excreted between 7 and 10 a.m. may be taken roughly as equivalent to one-tenth of the day's output.

The *saturation test* devised by Harris and Ray (1935) gives a much more objective and reliable indication of the nutritional status with respect to this vitamin. The procedure is to determine the ascorbic acid content of 24 hours' urine by the usual method of titration with a standard solution of the indicator. The subject is restricted to his usual diet and then given a test dose orally of pure ascorbic acid, usually about 600 mg. for an adult of average size and less for children, depending on approximate body-weight. The urinary excretion of ascorbic acid is then followed. In subjects well-nourished with respect to vitamin C the excretion curve rises rapidly to a high level and quickly decreases to the basal level. In subjects, deficient in vitamin C, the curve rises to a low level and gradually recedes to a level which is slightly higher than the basal, depending on the extent of vitamin-C deficiency.

The *blood level* of vitamin C is an useful criterion in cases of mild deficiency. In order to eliminate the influence of small amounts of other reducing substances in blood which cause slow reduction of the dye, Pijoan and Klemperer (1937) have modified the method of titration by taking into account the speed of titration and the proper choice of end point. Their method is now being extensively used for the determination of vitamin C in blood.

Capillary fragility test.—The capillary fragility test devised by Göthlin (1933) is based upon the idea that vitamin C is necessary for the formation of intercellular material which is the foundation of all fibrous structures. This cementing substance holds together the single layers of endothelial cells which form the wall of the blood capillaries. When the cement fails on account of the lack of vitamin C, the blood vessels are weakened and become permeable to blood. The degree of fragility of the capillaries seems to correspond to a certain extent with the degree of deficiency of vitamin C. The test is, therefore, applied to determine the degree of fragility of the vascular wall, either by producing venous stasis by constriction of the capillaries or by distension by suction with a cupping glass. The number of petechiæ appearing at a given pressure, measured by a pressure gauge, is taken as an indication of the degree of deficiency of vitamin C. The 'capillary resistance' test appears to be fairly reliable when infants and young children are being investigated, but is unreliable when applied to adults.

Intradermal test.—The intradermal test is based on the time taken for a small quantity of a solution of the indicator 2 : 6 dichlorophenol-indophenol, injected under the skin to lose its colour. The test is gaining considerable popularity and the results are reported to be in agreement with those of the more accurate methods.

Vitamin B_1

The chemical methods for the estimation of vitamin B_1 are less completely established. Jansen (1936) devised a procedure for the determination of vitamin B_1 based on the formation of a fluorescent derivative thiochrome, first observed by Peters. The principle of the thiochrome test is the partial oxidation of vitamin B_1, by means of a mild oxidation with potassium ferricyanide into the fluorescent derivative thiochrome, and to measure the degree of fluorescence against some suitable standard. Westenbrink and Goudsmit (1937) applied this test for the estimation of vitamin B_1 in urine for clinical purposes. The principal difficulty with the method as applied to urine has been the presence in urine of various non-specific substances which may interfere with the measurement of fluorescence upon which the thiochrome reaction depends. According to the procedure adopted by these authors, the vitamin B_1 is first adsorbed on franconite and the fluorescence is subsequently measured by a photo-electric fluorometer. Wang and Harris (1939) have introduced a number of modifications in the original technique, which have greatly improved the simplicity and the sensitivity of the method, and the results given by the procedure agreed with those obtained on the same specimen of urine by biological assay. The special feature of the technique is the omission of any adsorption process and the removal of the interfering substances by preliminary extraction of urine with isobutinol and subsequent washing of the final isobutinol solution of thiochrome with water. According to these authors direct visual comparison of fluorescence seems to be desirable for the sake of simplicity and saving of expense and time.

Urinary excretion of vitamin B_1.—The estimation of vitamin B_1 in the urine was suggested by Harris and Leong (1936) as a method of assessing the body 'reserve' of the vitamin. The urinary excretion was found by Birch and

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Harris (1934) to be dependent on the past intake, being low for example in beri-beri, and in 'conditioned' polyneuritis. Since then a number of investigators have measured the urinary excretion of vitamin B_1 and confirmed the fact that it is correlated with the nutrition of the body. Wang and Harris also observed low excretion in conditioned deficiencies and attributed it to anorexia or faulty absorption of the vitamin. They found the daily excretion of most of the normal individuals whom they examined to lie between 150 to 240 mg. Westenbrink and Goudsmit (1938) are of opinion that individuals excreting over 100 mg. of vitamin B_1 are saturated with the vitamin. A close correlation between the dietary history and urinary excretion of the vitamin was observed by Robinson, Melnick and Field (1940). Their studies on experimental vitamin-B_1 deficiency indicate that urinary excretion falls off very promptly when an inadequate diet is taken. They suggest that urinary response to a test dose is then needed to evaluate the body stores.

Harris and co-workers (1938) recommended that for assessing the level of nutrition of a human subject measurement should be made first of the 'resting level' of excretion and then of the response to standard test doses, the latter giving information as to the degree of the saturation of the tissue. According to Wang and Yudkin (1940), any attempt to assess the state of nutrition of any individual in respect of vitamin B_1 by the estimation of 'resting level', without the administration of test doses, is liable to lead to false conclusions. In the first place, owing to the variations existing among the individuals, the excretion gives only an approximate indication of the intake. Secondly, the excretion varies so rapidly with the intake that it reflects to a large extent on the diet being consumed within the day or two preceding the test. Administration of 'test doses' seems to be essential for the detection of the presence and degree of deficiency. The morning excretion of vitamin B_1 after a 1 mg. 'test dose' as a rapid test of nutritional level, as suggested by Westenbrink and Goudsmit (1938), has been reported by Hills (1939) to give a more reliable guide than the 24 hours' excretion.

Pyruvic acid is a normal intermediate product of carbohydrate metabolism. The pyruvic acid content of blood and urine has been studied in relation to vitamin-B_1 nutrition. The estimation of pyruvic acid in blood and also the determination of bisulphite-binding substances of the blood, cerebrospinal fluid and of urine were suggested by Platt and Lu (1936) as a useful criterion in the diagnosis of the vitamin-B_1 deficiency. The same authors in (1939) observed increased pyruvic acid in blood of all cases of fulminating and in a number of cases of sub-acute beri-beri. A practical issue of their investigation on blood pyruvate during exercise is the use which can be made of exercise combined with the measurement of blood pyruvate to reveal latent vitamin-deficiency states. The 'exercise test' will have limited value because of the inability of the patients to engage in a heavy effort. It is suggested, therefore, that a modification may be made based on the determination of blood changes following a measured amount of work in a limb in which venous return is obstructed.

Meiklejohn (1937) described a method based on the ability of vitamin B_1 to promote the growth of fungus *Phycomyces blakesleeanus* for estimating vitamin B_1 in blood. Sinclair (1938) has shown that the method does not provide a quantitative estimate of the true vitamin-B_1 content of the blood, since blood invariably contains substances other than vitamin B_1 that affects the growth of the fungus. In 1939 he described a modification of Meiklejohn's method which can be employed for the total vitamin B_1 in blood and suggested that a value of 4.5 mg. per 100 c.cm. or less for human blood is considered to be significantly low.

Nicotinic acid

When in 1937, nicotinic acid was found to be a specific cure for black tongue in dogs and for pellagra in human beings, it became necessary to devise methods to estimate in urine, with the object of determining the 'level of nutrition' of this vitamin. A method based on the colour reaction given by pyridine derivatives with 2 : 4 dinitrochlorobenzene has been recommended by Vilter *et al.* (1938) for the estimation of nicotinic acid in urine. The results obtained by the use of this procedure were found to be widely divergent from those obtained by the more recent methods based on the colour test for pyridine derivatives, introduced by König in 1904, namely the reaction with cyanogen bromide plus aromatic amines. Swaminathan (1938), Bandier and Hald (1939), Harris and Raymond (1939) and others have recently described a test for nicotinic acid based upon the same reaction. Harris and Raymond claim that the method is so planned as to circumvent the operation of various disturbing factors. The special feature of the method is the preliminary heating of the urine with NaOH to convert any amide into acid and to neutralize it. The specimen is divided into four equal portions; one is kept blank and to the other three are added 0, 20, and 40 mg. of nicotinic acid. The three solutions, which are kept protected from light, are all treated in the same way, being in turn warmed with CNBr, cooled, treated with *p*-aminoacetophenone, allowed to stand, acidified and then the three colour intensities measured in a Pulfrich photometer with S 47 filter, comparing with the blank to which no CNBr has been added. In man urinary output has been found to vary according to the intake and rise after a test dose. Lowered values were found in pellagra and anorexia. The normal range of values was usually from 3 to 5 mg. per day. They suggest that further

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detailed work is still needed to establish exact quantitative standards of normality. Robinson, Field and Melnick tried various methods of 'saturation' test and seem to have found not much promise for the direct laboratory diagnosis of nicotinic-acid deficiency (unpublished).

The occurrence of an abnormal 'porphyrin-like pigment' in the urine of the pellagrins reported by Beckh, Ellinger and Spies (1937) appears to be of considerable interest. Spies and associates (1938) reported that in 16 pellagrins receiving vitamin supplement, the pigment excretion in the urine returned to normal in from one to six days. But in 4 pellagrins on a basal diet without vitamin supplement, the pigment excretion also returned to normal, but not for four or six weeks. The excretion of these pigments has also been reported in the urine of patients with disease other than pellagra. Field and Melnick (1940) suggested that the possibility of an associated vitamin deficiency in such patients and the relation of such pigment excretion to liver diseases deserve further investigation.

Riboflavin

Very little work has been done on the riboflavin content of human body fluids. Chemical and physical methods for the determination of riboflavin have been developed. A blue-green fluorescence exhibited by riboflavin in ultraviolet light serves as a basis for its determination by the fluorometric method. The general principles of these methods are the extraction of the flavin with water, dilute alcohol and dilute acetone: adsorption on fuller's earth and elution with dilute pyridine; estimation of the riboflavin content of the eluate by comparing the fluorescence with that of solutions of known riboflavin content. The method recently described is that by Ferrebee (1940) for the estimation of riboflavin in urine, in which the optical system is a definite improvement over that of previous methods. The results obtained by the methods as compared with other methods indicate good specificity and accuracy. Vivanco (1935) reported that in experimental riboflavin-deficient rate there is an early drop in the urinary excretion of the vitamin. A similar drop in the urinary excretion in human beings and the subsequent response to test doses reported by Emmerie (1937) indicate that the urinary excretion may be used as a measure of riboflavin nutrition in man.

Vitamin D

The general function of vitamin D is probably to facilitate the assimilation of calcium and phosphorus in the body and thus create a favourable condition for the calcification of growing bones. Imperfect calcification due to the deficiency of vitamin D can be detected by *x*-ray examination of the wrist. 'There is general agreement that *x*-ray signs frequently fail to parallel clinical signs. An earlier indication of pre-rachitic condition is the excess of enzyme phosphatase in the blood.' This increased phosphatase appears before clinical or radiographic signs and even before changes in the calcium and phosphorus level of the blood. Bodansky and Jaffe (1934) concluded that the level of serum phosphatase is an excellent index to the activity of rickets and also a measure of rate of healing. The phosphatase content of blood of presumably healthy children has been found to vary between 50 to 200 units (1 unit being defined as the amount of enzyme required to release 1 mg. of phosphorus from its organic compounds in 24 hours at 37°C.). Any value over 300 indicates definite active rickets.

Conclusion

The gross pathological conditions associated with the more extreme deficiencies are sufficiently characteristic to be easily recognized, but in the many cases of less apparent deficiency disease causing ill-health, the signs and symptoms are rather indefinite and of a nature that might be produced by other causes. There is the same uncertainty regarding the chemical and biological tests used in assessing the state of vitamin nutrition in human subjects. Thus, hemeralopia or night-blindness may occur due to a number of causes in addition to deficiency of vitamin A. The blood phosphatase may be increased in various bone conditions and also in other diseases. The clinical tests used for vitamin C in urine are not strictly specific for vitamin C, since it is reported that a large part of the reducing capacity of the urine is due to substances other than vitamin C. There is, therefore, the need of exercising great caution in interpreting the results of these tests. Although the subject is still in the experimental stage, it may ultimately prove to be of great practical importance in clinical medicine. Sir John Boyd Orr (1940) suggests that 'what is needed at the present time is a closer linking up of laboratory research and clinical observation'. A close co-operation between the laboratory worker, the expert clinician and the school medical officer, who has to deal with a large number of children, the majority of whom, being in the border line of deficiency, are likely to make important contributions, to our knowledge, of vitamin nutrition, will prove to be of the greatest value in the field of preventive medicine.

REFERENCES

BANDIER, E., and HALD, J. (1939). *Biochem. J.*, **33**, 264.

BECKH, W., ELLINGER, P., and SPIES, T. D. (1937). *Quart. J. Med.*, **6**, 305.

BIRCH, T. W., and HARRIS, L. J. (1934). *Biochem. J.*, **28**, 602.

BLOCH, C. E. (1921) .. *J. Hyg.*, **19**, 283.

BODANSKY, A., and JAFFE, H. L. (1934). *J. Biol. Chem.*, **105**, xi.

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CARR, F. H., and PRICE, E. A. (1926). *Biochem. J.*, **20**, 497.

DANN, W. J., and EVELYN, K. A. (1938). *Ibid.*, **32**, 1008.

VAN EEKELEN, M., and EMMERIE, A. (1935). *Acta Brevia Neerland Physiol. Pharmacol. Microbiol.*, **4**, 171.

EMMERIE, A. (1937) .. *Ibid.*, **7**, 71.

FERREBEE, J. W. (1940). *J. Clin. Investigation*, **19**, 251.

FIELD, H., and MELNICK, D. (1940). *J. Lab. and Clin. Med.*, **26**, 45.

FRIDERICIA, L. S., and HOLM, E. (1925). *Amer. J. Physiol.*, **73**, 63.

GÖTHLIN, G. F. (1933). *J. Lab. and Clin. Med.*, **18**, 484.

HARRIS, L. J., and ABBASY, M. A. (1939). *Lancet*, *ii*, 1299.

HARRIS, L. J., and LEONG, P. C. (1936). *Ibid.*, *i*, 886.

HARRIS, L. J., and RAY, S. N. (1935). *Ibid.*, *i*, 71.

HARRIS, L. J., and RAYMOND, W. D. (1939). *Biochem. J.*, **33**, 2035.

HARRIS, L. J., *et al.* (1938). *Lancet*, *i*, 539.

HECHT, S. (1937) .. *Physiol. Rev.*, **17**, 239.

HILLS, G. M. (1939) .. *Biochem. J.*, **33**, 1966.

JANSEN, B. C. P. (1936). *Rev. Trav. Chim.*, **55**, 1046.

JEANS, P. C., and ZENTMIRE, Z. (1934). *J. Amer. Med. Assoc.*, **102**, 892.

KIMBLE, M. S., and GORDON, E. S. (1939). *J. Biol. Chem.*, **128**, lii.

KÖNIG (1904) .. *J. Prakt. Chem.*, **69**, 105.

LINDQVIST, T. (1938) .. *Acta. med. Scandinav.*, Suppl., **97**, 1.

MEIKLEJOHN, A. P. (1937). *Ibid.*, **31**, 1441.

MINDLIN, R. L., and BUTLER, A. M. (1938). *J. Biol. Chem.*, **122**, 673.

ORR, J. B. (1940) .. *J. Roy. Inst. Pub. Health and Hyg.*, **3**, 9.

PIJOAN, M., and KLEMPERER, F. (1937). *J. Clin. Investigation*, **16**, 443.

PLATT, B. S., and LU, G. D. (1936). *Quart. J. Med.*, **5**, 355.

Idem (1939). *Biochem. J.*, **33**, 1525.

ROBINSON, W. D., MELNICK, D., and FIELD, H. (1940). *J. Clin. Investigation*, **19**, 399.

SINCLAIR, H. M. (1938). *Biochem. J.*, **32**, 2185.

Idem (1939). *Ibid.*, **33**, 2027.

SPIES, T. D., *et al.* (1938). *South. Med. J.*, **31**, 483.

SWAMINATHAN, M. (1938). *Indian J. Med. Res.*, **26**, 427.

SYDENSTRICKER, V. P., *et al.* (1940). *J. Amer. Med. Assoc.*, **114**, 2437.

TILLMANS, J., *et al.* (1932). *Zeitschr. Untersuch. Lebensm. Ittal.*, **63**, 1.

VILTER, S. P., *et al.* (1938). *J. Amer. Chem. Soc.*, **60**, 731.

VIVANCO, F. (1935) .. *Naturwissenschaften*, **23**, 306.

WALD, G. (1938) .. *J. Gen. Physiol.*, **21**, 795.

WANG, Y. L., and HARRIS, L. J. (1939). *Biochem. J.*, **33**, 1356.

WANG, Y. L., and YUDKIN, J. (1940). *Ibid.*, **34**, 343.

WESTENBRINK, H. G. K., and GOUDSMIT, J. (1937). *Rec. Trav. Chim. Pays-Bas*, **56**, 803.

Idem (1938). *Arch. néerl. Physiol.*, **23**, 79.

BLOOD AND PLASMA TRANSFUSION*

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THE difference between scientific medicine, sometimes known in this country as Western medicine, and the various traditional systems of medicine that have been practised in the past in many countries—and are still practised very widely in India to-day—is that scientific medicine is progressive. Scientific medicine grew directly out of a traditional system of medicine, a system that was based on the teachings of that great Greek physician Galen. Galen lived in the second century, and his teachings dominated all medical practice in the Western world for fifteen hundred years. During these dark ages, men and women were burnt at the stake, not only because they differed in their religious beliefs from the reigning prince, or from the bishop in power at the time, but because their medical teachings and practices deviated from those laid down by Galen. If Galen had said that it was so, it was so, and it was heresy to contradict the statement. All controversy centred round the *interpretation* of Galen's writings; his authority could not be questioned. There must have been smouldering suspicion in the minds of many practitioners of those days that Galen was sometimes wrong, but it took bold spirits, such as Harvey, to express these doubts publicly. When Harvey described the circulation of the blood the first serious blow was struck at the foundations of Galen's teachings, and scientific medicine was born.

Scientific medicine grew slowly at first, but the advance has been speeded up very considerably during the last hundred years, so that to-day the pace is sometimes a little bewildering even to the practitioners of scientific medicine themselves, and the layman is liable to say 'I don't hold with all these new-fangled ideas; what was good enough for my father is good enough for me'. If that were the universal attitude and we were prepared to accept it, it would make the life of the medical man much simpler, but it would mean that we abandoned our claim to be practitioners of scientific medicine. We do not despise what our fathers taught us; we do not despise what we can gather from the traditional systems, those of the past or those that are still practised; but we accept nothing without questioning, without first testing it by modern scientific methods. We apply all that we find good from the past and we continue to add to it the scientific discoveries of the present age.

*Being a 'Burdwan Lecture' given on the 6th February, 1942. The Burdwan Lectures are a series of special lectures given annually at the Ronaldshay Medical School, under an endowment scheme founded by the late Maharajadhiraja, Sir B. C. Mahtab Bahadur, G.C.I.E., K.C.S.I., I.O.M., LL.D., of Burdwan.

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The present speed of scientific advance is, I have said, at times bewildering to the medical man; it will be much more so to the layman, who often accuses us of continually changing our minds. He will say, 'A few years ago you told me that serum was the last word in the treatment of pneumonia, last week you told me that sulphapyridine had revolutionized the treatment of this disease, and to-day you tell me that in sulphathiazole you have a better drug. When am I to believe you?' What is worse, they accuse us of going round in circles. They say 'why that treatment was discarded a hundred years ago, and you tell me that it is the latest form of treatment?' We smile tolerantly; we can usually afford to do so, because we know just why the method was discarded a hundred years ago and just why it has been taken up again to-day. Just a little fact that science has provided during these hundred years has made all the difference between failure and success.

Blood transfusion provides an excellent example of a form of medical treatment that has been repeatedly taken up and dropped again. The idea that blood was a strength-giving fluid is a very old one. The Egyptian Pharaohs used to have the life-blood of their enemies and slaves poured over them. It did not do them much good, apparently, so the practice was abandoned, but there is evidence that this idea recurred again at frequent intervals during historical times. Then, when the circulation of the blood was discovered by Harvey, the idea of giving this life-saving fluid directly into the circulation soon followed, and, in 1665, a Cornish physician transfused blood from one animal to another. Denys de Montpellier, physician to Louis XIV, is credited with giving the first blood transfusion to a human being, but by this time the practice must have been common for it is mentioned by Pepys in his famous diary. However, the practice fell into disrepute and it was banned in England by the Royal Society, by the Académie de Médecine in France, and by the Pope in Rome. It was revived 150 years later in England by a Guy's Hospital obstetrician. This doctor is said to have saved many patients by this method; he must have been a lucky man, for it was only chance that saved his patients' lives. Again the practice enjoyed a short period of popularity and once again it was more or less abandoned. Then, in 1900, came Landsteiner's great discovery of the blood iso-agglutinins and iso-agglutinogens, and the whole practice of blood transfusion was changed from a matter of pure chance to a controlled scientific procedure. He discovered that different people belong to different blood groups and showed that if one was transfused with blood of the right group all was well, but, if not, immediate death might result. Science had supplied that little fact that made all the difference, and blood transfusion had come to stay.

Landsteiner and those who followed him showed that in the human serum there are iso-agglutinins and in the red cells there are iso-agglutinogens, and that when blood from two different persons is mixed, if the iso-agglutinin comes in contact with the appropriate iso-agglutinogen the red cells will agglutinate. If the agglutination takes place within the blood vessels during a blood transfusion, the patient is likely to die suddenly. It was found that there are two iso-agglutinogens A and B and two corresponding iso-agglutinins α and β and that the blood of the human race is divided into four groups, according to whether their red cells (*see* table, column 2) contain—

both iso-agglutinogens, A and B
one iso-agglutinogen only, namely, A
one iso-agglutinogen only, namely, B
or no iso-agglutinogens

An American investigator, Moss, applied the four numbers, I, II, III and IV, to the four different groups (*see* table, column 1), and all would have been well had not another investigator in Europe, Jansky, given different numbers to the groups. This of course led to confusion until a committee of the Health Organization of the League of Nations decided on a new, a very simple and rational, nomenclature, based on the agglutinogen content of the red cells, namely, AB, A, B, or O (*see* table, column 4).

TABLE

1	2	3	4	5	6
Moss	Red cells	Plasma	International	May receive blood from	May give blood to
I	Both iso-agglutinogens	No agglutinins	AB	AB (A, B or O)	AB only
II	One iso-agglutinogen, namely A	β(anti-B) agglutinin	A	A (or O)	A (or AB)
III	One „ „ „ B	α (anti-A) „	B	B (or O)	B (or AB)
IV	No iso-agglutinogens	α and β agglutinins	O	O only	O (or A, B or AB)

So much for the agglutinogens, but what about the agglutinins in the serum? In every case these must conform, for, if the patient's serum were to contain α (or anti-A) agglutinin and his red cells A agglutinogen, he would agglutinate his own red cells. Such a condition would be incompatible with life, and, therefore, if we know the agglutinogen content of an individual's

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red cells, we can deduce the agglutinin content of his serum. Thus, an AB individual has no agglutinins, an A individual has β (anti-B) agglutinins, a B individual α (anti-A) agglutinins, and an O individual both α and β agglutinins (*see* table, column 3).

The agglutinogens present in blood are much stronger than the agglutinins. So the first danger in a transfusion comes from the donor's red cells and if the recipient's serum contains any agglutinins at all, that is to say, if he is of groups A, B or O, with serum containing β (anti-B), α (anti-A) or α and β agglutinins, respectively, he can only be given blood from persons whose red cells do not contain the corresponding agglutinogen, that is, if he is group A (and has β agglutinins) he must be given group A blood (containing only A agglutinogens or group O blood (containing no agglutinogens), if he is group B (with α agglutinins) he must be given group B blood (containing only B agglutinogens) or group O blood (containing no agglutinogens), and if he is group O (with both α and β agglutinins) he must be given group O blood (containing no agglutinogens). If, however, the recipient is group AB his serum contains no agglutinins and he can be given any kind of blood—such a person is known as a *universal recipient*. You will also have noticed that group O blood—which has no agglutinogens—can be given to a patient of any group and a person of group O is known as *universal donor*.

So much for the first danger, from the donor's red cells, but what about his serum? The donor's serum contains agglutinins. Agglutinins are weaker than agglutinogens, and so if the blood is given slowly and not in large amounts the serum will be diluted by the recipient's blood and no agglutination of his red cells will occur, but if it is given fast and in large amounts there is a danger that the recipient's red cells may be agglutinated by the donor's serum. This danger applies particularly when the universal donor gives blood to a person not of his own group, especially if his agglutinins are present in high titre; a person with agglutinins present in high titre is known as a *dangerous universal donor* and should only be used to give blood to persons of his own group.

This danger also applies when a universal recipient receives blood from anyone other than his own group. For example, when he receives A-group blood the serum of which contains β (anti-B) agglutinins, these agglutinins, if in high titre, may agglutinate his red cells which contain the B agglutinogen. These dangers make it imperative that whenever a blood transfusion is to be given a direct cross-matching—that is to say, a matching of the donor's red cells against the recipient's serum and the recipient's red cells against the donor's serum—should be done.

To summarize, an individual of group AB may be given group-AB blood, or groups A, B and O with certain precautions; one of group A may be given group-A blood, or group-O blood with certain precautions; one of group B may be given group-B blood, or group-O blood with certain precautions, and an individual of group O must be given only group-O blood (*see* table, column 5).

A donor of group AB may give blood only to a recipient of group AB; a donor of group A may give blood to a recipient of group A, or to a recipient of group AB with certain precautions; a donor of group B may give blood to a recipient of group B, or to a recipient of group AB with certain precautions; and a donor of group O may give blood to a recipient of group O, or to recipients of group A, B or AB with certain precautions (*see* table, column 6).

After this divergence I will take up the thread of my story again.

Blood transfusion was soon found to be such an important life-saving measure that in all civilized countries in the world blood transfusion services were started to provide blood, free or on payment, for patients who needed it. Such a service was started in Calcutta by Lieut.-Colonel R. B. Lloyd, the Imperial Serologist with the Government of India, about 15 years ago.

Blood transfusion is usually an emergency measure and the inevitable delay in obtaining a suitable donor will frequently be serious; the possibilities of obviating this delay were therefore explored. It was found that, if blood is taken under strictly aseptic conditions and kept in a cool place, it will retain all its therapeutic porperties for at least ten days. Organizations were therefore set up for keeping a number of transfusion doses of blood of the various groups ready for immediate use. Such an organization was started in Calcutta a few years ago under the auspices of the Red Cross at the suggestion of Sir U. N. Brahmachari, the president of the Calcutta branch of the Red Cross Society, and was again run by the Imperial Serologist, this time Lieut.-Colonel Greval.

It was found in large centres that this worked very well in normal times, as the requirements could be estimated fairly accurately. But, at the beginning of this war, the blood transfusion services in England, anticipating a demand for blood, called up a number of volunteers and collected a large stock of blood against this possible demand; no air raids occurred in the early days of the war and much of this blood became time-expired and had to be discarded.

The idea of using serum or plasma in the place of whole blood was not a new one, and, as there seemed no means of prolonging the life of whole blood *in vitro* beyond the ten days, the possibilities of using the plasma removed from time-expired blood in the place of whole blood were further explored. Recent work has shown that, in many conditions, plasma or serum is quite as useful as whole blood, and, as they can be preserved for a considerably

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longer time, for storage purposes plasma and serum replaced whole blood.

Plasma however has its limitations; it has to be kept at a very low temperature or changes occur, and though it can be stored for a much longer time than whole blood, this time is limited, so that again wastage is likely to occur. It was next found that if the moisture is removed from the plasma, by some process that does not entail denaturation of the serum protein, it can be preserved at atmospheric temperatures for a very much longer time than fluid plasma could be preserved in the refrigerator; such dried plasma can be redissolved in sterile distilled water wherever and whenever it is required for use. This last advance has opened up great possibilities as it has facilitated very considerably transport of plasma, and will probably in actual practice remove the time-limit for storage almost entirely; it is now possible to collect blood from anywhere in the world for use as plasma in any other part of the world.

Besides the advantages of easy preservation and rapid transport, serum or plasma has certain other very definite advantages.

Firstly, in conditions of shock without blood loss, there is a loss of plasma from the circulating blood into the tissues with a resultant concentration of the solid elements of the blood —the red cells; this interferes with the circulation. Giving whole blood does not relieve this state of affairs nearly as well as giving serum or plasma. Again, it is the loss of plasma protein from the circulation that is serious in shock, and, when reconstituting plasma from the powdered state, it is possible to make it hyper-concentrated, so that three or four times the amount of plasma proteins can be given in the same bulk.

Secondly, by using 'pooled' plasma or serum the need for blood grouping is obviated. By 'pooled' plasma, we mean plasma taken from the blood of a number of persons of different groups, that has been 'pooled' in a large vessel.

Let us consider what happens when blood is thus 'pooled'.

Say, for example, an A blood is mixed with a B blood; the β agglutinins in the A blood will act with the B agglutinogens in the B blood, the α agglutinins in the B blood will act with the A agglutinogens in the A blood, and agglutination of the red cells will take place. As the red cells are not to be used this does not matter, but as the agglutinogens are stronger than the agglutinins *all* the latter will be absorbed and the plasma will be safe to give to a patient of any group.

The practical result of this introduction of dried plasma is that, in countries at present outside the war zone, America and Canada for example, blood banks have been started for collecting blood from which plasma is separated and dried to be sent to the theatres of war and to towns in Great Britain for air-raid casualties.

A scheme has recently been inaugurated under the auspices of the Government of India for collecting and drying plasma in India for use in the eastern theatres of war and amongst the civilian population in India in the event of air raids on our towns. An apparatus for drying plasma has been ordered from America and is expected in this country very soon. Before plasma can be dried, the blood from which it is to be separated must be obtained, and it is hoped that this blood will be obtainable on a voluntary basis.

The scheme for obtaining volunteers is being organized in conjunction with the existing Red Cross Blood Bank Committee which has been considerably enlarged for this purpose.

The present aims of the Calcutta scheme are relatively modest; we only expect to collect about 50 quarts of plasma a week. How modest this is, you will appreciate when you hear that in one blood bank in Moscow they collected three-quarters of a ton of blood a day. But we are only making a beginning and as time goes on we shall expand the organization in Calcutta and eventually carry it to other towns in Bengal.

That is briefly the history of blood transfusion in general, and of the present Blood Bank scheme in Calcutta.

I am not proposing to give you a lecture on the treatment of war wounds and air-raid casualties, but you all know that of those who are not killed outright, or so badly wounded that early death is inevitable, the very large majority of soldiers who die, die of shock. If the shock can be combated, the chance of saving the life of the wounded man—and in these days we must add woman or child—is very greatly improved. It is placing it at a low figure to say that the lives of 50 per cent of such persons who would otherwise have died can be saved by a blood or plasma transfusion given immediately.

Besides shock there are many other conditions in which blood or plasma transfusion is indicated. They are—

1. *After acute hæmorrhage.*—To make good loss sustained by an acute hæmorrhage, the transfusion of whole or citrated blood, either preserved or fresh, is the most effective. The amount to be transfused will be dependent on the amount lost, but anything less than 500 c.cm. is unlikely to be effective.

2. *As a prophylactic measure against shock.* —In weak or exsanguinated patients, even if their condition would not ordinarily demand transfusion, this is often a very valuable procedure to prepare them for a surgical or obstetric operation; blood or plasma is given according to the blood state of the patient.

3. *In anæmia.*—Blood transfusion is indicated to replace blood lost by hæmorrhage or destroyed by other processes, to maintain life in the case of splastic anæmia, and/or to

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stimulate blood formation. Whole blood, citrated blood, or resuspended corpuscles can be used. In anæmia, repeated small transfusions of 300 to 400 c.cm. are usually better than a single big transfusion of, say, 1,000 c.cm.; in either case slow administration is to be recommended.

4. *For supplying other deficit elements, viz,* platelets in thrombocytopenic purpura, leucocytes in agranulocytosis, or fibrin in some cases of clotting deficiency, transfusion of whole blood will sometimes be effective.

5. *For counteracting toxins or increasing passive immunity.*—This is a procedure that was at one time in favour, particularly in America; the bloods of convalescents, or of others who had received injections in order to raise the antitoxic value of their blood, or to produce active immunity, were used as specific transfusions in certain cases. However, the new chemotherapeutic agents introduced in the last few years have put this procedure into the background.

Salines, glucose and gum solutions given intravenously may help temporarily in shock and some other conditions, but do not remain in the circulation in the same way that plasma or serum do, and collapse recurs. There is thus, in the treatment of shock, no true alternative to human blood products, and if lives are to be saved human blood must be obtained.

You must all know that the human organism is very elastic and has enormous reserves of all vital substances. For example, a large quantity of blood can be lost and yet by drawing on the immediate reserves the body will continue to function absolutely normally. The average blood donation for an adult is 500 c.cm., or about a pint; this amounts to one-tenth of the total blood volume, and represents about three days' normal manufacture of blood cells. The loss of this amount of blood has no physical ill-effect; in fact, it stimulates blood formation and will actually act as a tonic in many cases. Our forefathers appreciated the value of blood letting, but they abused it to such an extent that, like many other useful practices, it fell into disrepute. After giving a pint of blood, the inexperienced donor may feel some slight psychological effect, but actually it would be quite possible to play a hard game of tennis, though one would not recommend this practice. Most of you will be familiar with the operation of venepuncture and will know that it is an almost completely painless procedure.

Though the machine for drying plasma has not yet arrived, the blood bank in Calcutta has started operations for it was felt that it is quite time that we had a reserve of plasma or serum in our bank for our own needs in case of air raids, and it is possible to store serum in the fluid state for many months in a refrigerator. The main collecting centre for taking blood is at the All-India Institute of Hygiene, but, wherever there are a large collection of volunteers, arrangements are made to send our collectors.

I do not know if there is any transfusion organization in Burdwan, but, if there is not, I put forward the suggestion that one should be started immediately. Burdwan as well as Calcutta is well within the war zone, and bombs may be dropped on us at any minute. Then you will want either blood or plasma for use amongst yourselves.

The organization that we have set up in Calcutta for collecting and drying blood is a comparatively expensive one and one would not advocate anything of this kind in Burdwan, but to collect plasma for pooling requires much less apparatus, and in fact can be done on a very modest scale with very inexpensive apparatus.

Perhaps what is even more important for a place like Burdwan is that you should have a list of volunteer donors ready for an emergency. These volunteers should have their blood groups ascertained and their Wassermann or Khan tests done, so that a suitable person of the right group can be chosen immediately and the time that would be absorbed in doing the preliminary grouping saved.

I am not here to beg you to volunteer as donors, for I believe that every medical man and student who understands the value of plasma to the injured will immediately demand to have his blood taken for the sake of his fellow men, and possibly for his own sake, for who amongst us can be certain that to-morrow he will not himself be an air-raid casualty. What I do ask you to do is to dispel some of the stupid traditions that have grown in the minds of laymen about blood donation, and to assure all your patients regarding the safety of the procedure.

The loss of a small amount of blood *does not* make a person weak, it *does not* make him an easy prey to infectious diseases, it *does not* make men impotent or women sterile.

Every person coming to give his of her blood should have a physical examination first, but minor degrees of ill-health are not contra-indications for giving blood. The faint-hearted say, 'I am already so anæmic that I cannot spare any blood'. You must reply, 'then, nothing could be better than a little blood-letting to stimulate your hæmopoietic system'. Others will say 'My blood is so poor that it wouldn't be any good to anyone'. You reply, 'If it is good enough for you who are walking about doing your day's work, it will be good enough to help a wounded man to tide him over a period of shock'. Others say, 'I would give my blood, but my mother, my husband, my wife won't let me'. Then you must tell them that their mothers, their husbands, their wives may be condemning them to die of shock, for if all mothers, all husbands and all wives took this attitude, there would be no plasma for the sons, the wives and the husbands who became victims in air raids. I cannot answer all the possible

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objections that may be raised, but you, doctors and students, know the answers as well as I do, and there is always a good answer to these objections.

I will add just one piece of advice. If you can turn up your sleeve and say 'I gave my blood yesterday and it did me no harm' all your arguments will be much more convincing.

Medical News

ENHANCED ANTEDATE TO EMERGENCY COMMISSIONED OFFICERS OF THE INDIAN MEDICAL SERVICE

SOME weeks ago the Government of India intimated the concession of gratuities on a greatly enhanced basis to certain groups of emergency commissioned officers of the Indian Medical Service.

Government now announces a further important war-time concession which makes employment in the Indian Medical Service for the period of the present emergency highly attractive. It has been decided to give an antedate, based on professional experience, to emergency commissioned officers of the I.M.S. This antedate, which is limited to 5 years, will be reckoned on the basis of half the number of completed years from the date of medical qualification to the date of appointment to the I.M.S. Thus ten years spent in active practice of the medical profession will qualify for the maximum of 5 years antedate, 6 years in practice for 3 years antedate and 3 years in practice for 18 months. Antedate will not be reckoned in periods of less than 6 months and the minimum antedate to be granted will be one year, earned by two years' medical practice.

This concession will be in addition to any antedate which may be admissible to an officer of the service on account of special post-graduate qualifications and specified hospital appointments, except that a period spent in hospital appointments will not count twice in reckoning the total antedate admissible. The whole period of antedate which an officer may obtain will count for pay and promotion on the time scale and for seniority in the service.

APPROVED BADGE FOR AUXILIARY NURSING SERVICE

HER Excellency the Marchioness of Linlithgow, President of the newly constituted Auxiliary Nursing Service, has approved a badge for use in the Service.

The badge is circular in shape and is of the same size as the badge of the St. John Ambulance Association. A map of India with a star inset is embossed on one side with the words 'Auxiliary Nursing Service' around the margin and serial number is engraved on the reverse.

The badge is being made by His Majesty's Mint in Bombay in silver-plated cupro-nickel. Every registered member of the Service will be provided with the badge which will remain the property of the Government.

GREATER RESTRICTION ON IMPORTED MEDICAL STORES PROBABLE

IT is probable that with the progress of the war there will be much greater restriction on the import of drugs and other medical stores into India from the United Kingdom and America.

To enable the Government of India to deal expeditiously with any situation which might arise from restricted imports, a circular letter has been addressed to the principal importers of medical stores asking them to state the names of items imported during 1940 with the quantities.

This information is essential in order that the Government may obtain the co-operation of the United Kingdom and America and the Eastern Group countries in obtaining regular supplies of essential drugs and other medical stores for India.

Importing firms are required to submit to the Director-General, Indian Medical Service, New Delhi, a statement of their imports of drugs during 1940 stating against each item the quantity imported, customs declaration number and the country of origin.

SURGICAL AND ORTHOPÆDIC INSTRUMENTS

INDIA is now a predominant instrument producer among the Eastern Group countries and practically 100 per cent of hospital and operation theatre equipment and 98 per cent of orthopædic instruments and appliances are now produced by the Indian industries.

Planning is in progress for the production during the next twelve months of five million instruments and appliances by the Indian surgical instruments industry.

The purchase of surgical dressings and bandages by the Medical Stores Department has assumed almost astronomical proportions. In one indent alone about 6,700 miles of textiles were converted into bandages. The production capacity of India of cotton-wool is approximately 120,000 lb. per month and that of lint about 16,000 lb. per month.

First field dressings are being manufactured in large numbers in the factories of the Medical Stores Department and also by private firms. In the Madras Medical Store Depot the shell dressing factory is manufacturing nearly 1,000,000 shell dressings per month.

Scientific and medical glassware and neutral glass required for sterile solutions for injection purposes are also now being successfully produced in India.

The manufacture of rubber goods in India has been for many years encouraged by the Medical Stores Department. Good quality waterproof sheeting, hot water bottles and other articles required in rubber have been made in India for some time. Since the outbreak of the war, the number of items required in rubber made in India has greatly increased.

RECRUITMENT OF WOMEN MEDICAL GRADUATES TO THE INDIAN MEDICAL SERVICE FOR THE DURATION OF PRESENT EMERGENCY

THE Government of India have decided to recruit for the duration of the present emergency a limited number of women medical graduates to the Indian Medical Service with full liability for general service in and out of India. At present lady doctors having experience in oto-rhino-laryngology, radiology, pathology, ophthalmology or anæsthetics will be recruited. Recruitment will be open to both Indians and Europeans below the age of 45.

Women graduates will be appointed as 'medical officers' with the relative rank of Lieutenant in the Indian Medical Service and will be granted further advancement in rank like other Emergency Commissioned Officers of the Indian Medical Service. Pay will be the same as paid to men in the Indian Medical Service.

Detailed terms and conditions of service will be announced shortly.

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ANTEDATE FOR I.M.D. OFFICERS

FURTHER WAR-TIME CONCESSION ANNOUNCED

A FURTHER war-time concession in the Emergency Branch of the Indian Medical Department is announced by the Government of India. It is the grant of an antedate based on professional experience.

Some weeks ago the Government announced the concession relating to increase in the emoluments of Assistant Surgeons of the Emergency Branch of the Indian Medical Department. It has now been decided to give also an antedate, based on professional experience, to those Assistant Surgeons (India Cadre) who, prior to appointment to the Emergency Branch, have been in the practice of their profession for over three years.

The antedate, which is limited to five years, will be reckoned on the basis of half the number of completed years of their medical practice. Thus ten years spent in active practice will qualify for the maximum of five years' antedate; six years in practice for three years' antedate and so on. Antedate will not be reckoned in periods of less than six months.

In addition, an Assistant Surgeon (Indian Cadre) who at the time of his selection is in possession of a higher qualification, such as M.C.P.&S., M.M.F., M.S.M.F., and D.M.&S. or an equivalent post-licentiate qualification, may be granted an antedate not exceeding 12 months.

An antedate not exceeding six months may also be granted to an Assistant Surgeon who possesses a Diploma in Tropical Medicine, or a qualification which is recognized as equivalent in all respects to the above-mentioned qualification.

The whole period of antedate which an officer may obtain will in future count for increments of pay and seniority in the Service.

'NEED TO EDUCATE THE EDUCATED'

DR. AYKROYD ON IMPROVEMENT OF DIET IN INDIA

'ONE of the tasks of those who are striving to improve diet in India is to educate the educated', writes Dr. W. R. Aykroyd, Director of the Nutrition Research Laboratories, Coonoor, in the third edition of Health Bulletin No. 23, entitled 'The Nutritive Value of Indian Foods and the Planning of Satisfactory Diets'.

Dr. Aykroyd continues: It is not only the poor, whose choice in the matter of food is extremely limited, who are ignorant and prejudiced about diet suffer in health because of it. Plenty of people in India and elsewhere, who could afford to consume an excellent diet, and feed their children on an excellent diet, do not in fact do so. One can readily find among children of the more prosperous classes cases of serious malnutrition and food-deficiency disease.

Those who suffer from under and malnutrition usually cannot afford to purchase a satisfactory diet. Many residential institutions for children in India are very short of money, and have often to feed their boarders on Rs. 3 per head per month, or a good deal less. Now it is difficult, in fact impossible, to supply a really satisfactory diet for such sums.

Value of milk

But even when poverty prevents the purchase of a diet which satisfies modern standards of nutrition, it is often possible to make effective improvements with little increase in cost.

It is desirable that children should consume upwards of 8 oz. of milk a day—8 oz. being an amount below that recommended as 'optimum' by nutrition workers elsewhere. If available funds do not admit the addition of this quantity of whole milk, butter-milk or skimmed milk, reconstituted from skimmed milk powder, may be supplied. *Even a little milk is better than none.*

Careful experiments have shown that the giving of 8 oz. of skimmed milk daily to children fed on an average 'ill-balanced' Indian diet results in an acceleration of growth and a great improvement in health and well-being. Such an addition is not very costly, and is now being supplied in a considerable number of children's homes in India, to the great benefit of the children.

Calcium is found abundantly in milk (including skimmed milk and butter-milk), cheese and green leafy vegetables. Amaranth, fenugreek and drumstick leaves are rich in calcium. Children need relatively more calcium and other minerals than adults, just as they need relatively more protein. Rice is very deficient in calcium, and there is evidence that insufficiency of calcium is one of the most important defects of the rice eater's diet.

Parboiled rice

If the cereal consumed is milled rice, an improvement in the nutritive value of the diet (and in the health of those consuming it) can be brought about by wholly or partially substituting whole rice, whole wheat or one of the millets, particularly ragi.

If milled rice remains the basis of the diet, it should be realized that the milled-rice eater needs more 'protective' foods—milk, green vegetables, fruits, etc.—than the consumer of whole wheat or ragi. When the diet is almost wholly composed of rice—when people are so poor that they cannot afford to buy other foods except in minute quantities—then the state in which the rice is eaten becomes of paramount importance. Parboiled rice, even when milled, is superior in nutritive value (particularly as regards the anti-beri-beri vitamin) to raw rice milled to the same degree.

Diets in children's homes, and among the general population, are often low in fat. Addition of extra vegetable oil (at the expense of a quantity of cereal supplying an equivalent number of calories) does not greatly increase expenditure. Pure ghee or butter is, of course, preferable to vegetable fat, but very much dearer.

Pulses are rich in protein and in some of the B vitamins; 2 to 3 oz. per day increase the nutritive value of a diet largely composed of cereals. However, the pulses in general are less valuable dietary supplements than animal foods such as milk, fish and meat.

Groundnuts

More use could perhaps be made of groundnuts, which are rich in various food-factors, including some of the B vitamins, as human food. Half to one ounce daily helps to supply some of the elements in which poor rice diets are deficient.

Fruits should always be included in children's diets. Plantains, a cheap fruit often supplied in hostels, are good food but not of exceptionally high nutritive value. Tomatoes and oranges and other 'juicy' fruits are richer in vitamins and make a useful addition to diets of the poorer type.

Manufactured vitamins

Daily doses of iron or calcium lactate may have an excellent effect. Within recent years, the chemical composition of a number of vitamins has been discovered and some of them can now be manufactured cheaply and in large quantities. Vitamins produced in this way are just as valuable to the body as vitamins contained in foods.

Further developments in research or industry may make it possible to produce many vitamins in pure form at so low a cost as to make their widespread use in improving poor Indian diets a feasible proposition. This stage has not yet been reached, and meanwhile it is necessary to rely chiefly on suitable combinations of ordinary foods in devising improved diets.

But the idea of giving malnourished children a daily capsule containing more than their requirements of the various essential vitamins in concentrated form is not so outlandish as it seems.

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In England, pure vitamin B, made in a factory, is being added to bread made from refined wheat flour to bring its nutritive value nearer to that of wholemeal bread. In America also, great interest is being taken in the possibility of 'fortifying' foods and diets by means of cheap manufactured vitamin preparations. The uninterrupted development of scientific research for a few decades may produce the most striking and unexpected results in this direction.

RESEARCH INTO IMPROVEMENT OF POTATO CROP

THE principal recommendations and conclusions of the Agricultural Marketing Adviser to the Government of India on the growing and marketing of potatoes are summarized in a convenient form in an abridged version of the Report on the Marketing of Potatoes in India and Burma.

Potatoes are an important money crop, the annual production being worth about Rs. 9,50,000. There has been a steady increase in acreage during the last ten years, but India still imports on an average more than a million maunds of potatoes a year. These large imports indicate the scope for increasing the area under potatoes, particularly in the hills.

The Agricultural Marketing Adviser recommends that more research should be undertaken with a view to improving the quality and yield and that arrangements should be made for the organization of seed supplies and credit to cultivators for the purchase of seed and manure. The grading of potatoes, he holds, is absolutely essential, while market practices should be standardized and market charges fixed. Every encouragement, he suggests, should be given to the formation of co-operative sale societies; the cost of distribution should be reduced by eliminating intermediaries as far as possible, charges for transport of potatoes by rail should be reduced and additional facilities should be provided for storing and marketing potatoes at terminal stations.

Potatoes cannot be successfully grown in the plains during the summer. The Agricultural Marketing Adviser recommends that the surplus produce of the main crop in the plains should be kept in cold-storage and released during periods of scarcity; or, as an alternative, the growing of larger quantities of potatoes in the hills should be taken up.

VITAMIN WHICH PREVENTS SCURVY

USES OF 'AMLA'

VITAMIN C or ascorbic acid, the vitamin which prevents scurvy, is found in fresh fruits and vegetables. Among vegetables, the green leafy varieties are the best sources.

Pulses and cereal grains in the ordinary state contain no vitamin C. When, however, they are allowed to sprout, the vitamin is formed in the grain and in the growing green sprouts.

There is one cheap and common fruit, namely, *amla* or *nellikai* (*Phyllanthus emblica* Linn), which is probably the richest natural source of vitamin C. *Amla* (gooseberry) grows abundantly in all Indian forests and is obtainable in almost unlimited quantities from January to April. The fresh juice contains nearly twenty times as much vitamin C as orange juice, and a single fruit is equivalent in vitamin C content to one or two oranges.

The heating or drying of fresh fruits or vegetables usually leads to the destruction of most or all the vitamin C originally present. *Amla* is an exception among fruits because of its high initial vitamin C content, because it contains substances which practically protect the vitamin from destruction on heating and drying, and because its juice is strongly acid. Acidity has a protective action on vitamin C. Hence it is possible to preserve *amla* without losing much of the vitamin.

Amla is included as an ingredient in many Ayurvedic medicines and tonics. Fresh *amla* was found to be a most effective cure for scurvy when an outbreak of the disease occurred in 1940 in the Hissar famine area. Tablets made from *amla* powder contain vitamin C in concentrated form and this is a convenient method of preserving this vitamin for future use.

REPORT OF THE LEPROSY SURVEY SUB-COMMITTEE OF THE INDIAN RESEARCH FUND ASSOCIATION

THIS report is headed Leprosy Surveys; objects, methods and interpretation of findings. The reason for the appointment of this committee and the general lines of the report are stated in the introduction:—

'Recent survey work in other countries and in India has indicated the occurrence of considerable variations in leprosy, particularly in the age-distribution and in the type-distribution of the cases (that is, proportion of the cases belonging to the two main groups, neural and lepromatous). It has become clear that these two factors, and probably also other factors, are of considerable importance as indications of the seriousness or otherwise of the leprosy problem, and that mere enumeration of the cases is of limited value.

It is therefore important that leprosy surveys should be carried out according to a more or less uniform plan which will provide for the collection of data covering the points mentioned above. If this is done it should be possible to compare the leprosy survey findings in different parts of the country and thus form a truer picture of the leprosy problem of India.

The ground covered by this report is indicated by the title "Leprosy Surveys; objects, methods and interpretation of findings". The report not only deals with the principles of leprosy survey, but also with the actual practical details of the work. The report is based on practical experience of leprosy survey work in various parts of India over a number of years.'

The different sections of the report deal with the following subjects:—the objects and types of survey (three types of survey are outlined); general notes on survey methods; survey units, staff, etc.; outlines of the three different types of survey methods used, the selection of the area for survey, and the records and reports of the survey; the analysis and interpretation of the survey findings; re-survey of previously surveyed areas; and the making of recommendations for anti-leprosy work based on survey findings. The appendices include notes on clinical manifestations of leprosy and classification of cases, on diagnosis and bacteriological examination.

The report succeeds in doing what it sets out to do, namely, to discuss the principles and practice of leprosy surveys and to outline methods of work and of presentation of reports which, with minor modifications, should be applicable to most, if not all, parts of the country. The general adoption of the methods outlined in this report would greatly facilitate the collection of accurate information about leprosy, and a comparison between the leprosy problem of one part of the country and another.

The report should be of great value to workers undertaking leprosy surveys for the first time; it contains suggestions and ideas which should be of interest and value even to the experienced survey worker. This report, we are informed, is being circulated to the different provinces of India in the hope that future surveys in these provinces will be carried out along the lines outlined. Copies of the report can be obtained from the Indian Research Fund Association, New Delhi, or from the Indian Council of the British Empire Leprosy Relief Association, New Delhi.

The committee, which consisted of Doctors Lowe, Dharmendra and Santra, are to be congratulated on the valuable report that they have produced. They are also lucky in having their report printed by a good press so that it is not mutilated by the printer, as are many of the best Indian Government reports.

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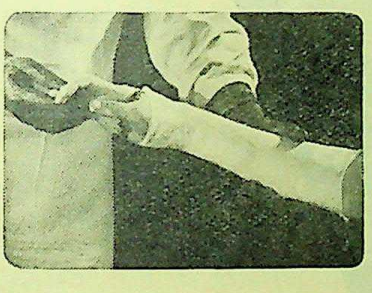
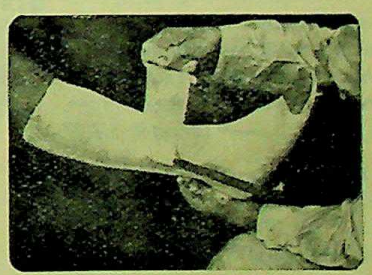
"GYPSONA" *The New and Improved*

PLASTER OF PARIS BANDAGE

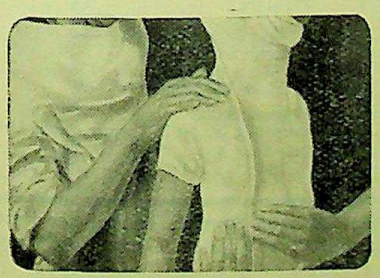
'Gypsona' Plaster of Paris Bandages are thoroughly and uniformly impregnated by a new process with plaster of paris, which ensures that every bandage is perfect. 'Gypsona' contains 90% of plaster by weight and there is no loose powder. Moistening takes only 5/10 seconds and the cast will set hard within 5/10 minutes. The 'Gypsona' bandage is obtainable in the following sizes:— 3″, 4″ and 6″ × 3 yards, packed in sealed tins of 12 bandages, or singly.



'GYPSONA *Plaster of Paris Bandages used for making the standard Colles' Plaster; the lightness and rigidity without bulk ensure an ideal cast.*



'GYPSONA' *Plaster of Paris Bandages, with a Böhler walking iron, being used in the construction of a below knee cast, the great strength of which will permit immediate weight bearing.*



'GYPSONA' *Plaster of Paris Bandages used to make a plaster fillet for case of Tuberculous Spine. The quick-setting of the plaster shortens the length of time in the apparatus and minimises the child's discomfort.*

Despite war conditions, it is expected that reasonable supplies will be maintained.

DISTRIBUTOR : RALPH PAXTON, 10, LALL BAZAR, CALCUTTA.

'GYPSONA' IS MADE IN ENGLAND BY THE MAKERS OF 'ELASTOPLAST,'
T. J. SMITH & NEPHEW, LTD., NEPTUNE STREET, HULL.

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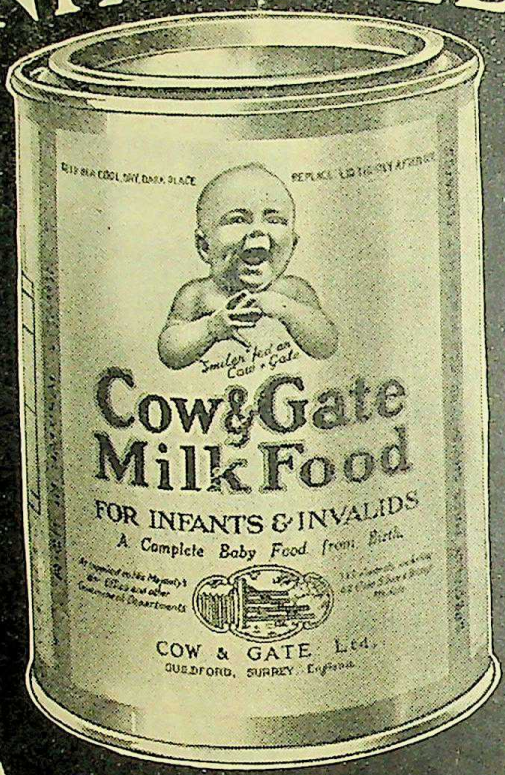
MODERN VIEWS OF INFANT FEEDING



Cow & Gate Milk Food

"The best available substitute for human milk is a good variety of dried milk. Such milk is safe, in that it is free from tubercle bacilli and pathogenic organisms; its vitamin and iron content is adequate; it is quickly and easily prepared and thereby error is reduced to a minimum; and it has been made to resemble human milk to an extent that could never be achieved in the average home". —"Lancet" 3.7.37.

This view is now well established in Medical and Nursing Practice, as is also the view that Cow & Gate Milk Food not only ensures bacteriological purity, provides adequate vitamins and minerals, is easily digestible and is simple to prepare, but also has been amply shown to provide the Doctor and Nurse with the most responsive Milk Food for their difficult cases.

ANALYSIS

	Dry Food	Reconstituted Milk (1 in 8)
	%	%
Fat	18.5	2.3
Proteins	27.0	3.4
Lactose	39.1	4.9
Sucrose	6.5	0.8
Mineral Salts	6.4	0.8
Moisture	2.5	87.8
	100.0	100.0
Calorific value per oz.	136	17
(per 100 grammes)	481	60.0

Vitamin D content per pint 250 International Units.

COUPON To CARR & CO. LTD., Wittet Road, Ballard Estate, Bombay. Please send me, post free, literature and clinical samples of Cow & Gate Milk Food.

Name .....

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Public Health Section

A MALARIO-ECONOMIC SURVEY IN RURAL SOUTH INDIA*

By PAUL F. RUSSELL
and
M. KUMARA MENON

Introduction

THIS paper reports a malario-economic survey made by a house-to-house canvass in three malarious and two non-malarious villages in south-eastern Madras between March 1939 and March 1940. The survey was undertaken in order to obtain some understanding of economic and social conditions with particular reference to malaria and its control. The malarious villages included were Kasangadu, Tuvarangurichchi, and Senjayakollai in Pattukkottai taluk of Tanjore District. The non-malarious villages were Ichchangudi and Someswarapuram, typical delta areas in Papanasam taluk, also in Tanjore District. In Pattukkottai taluk, the Cauvery-Mettur canal irrigation project opened in 1933-34, has brought malaria as a by-product into an area previously free from this disease. In Papanasam taluk there has been irrigation for centuries from canals taking off directly from the Cauvery river. There is no record of malaria in this area and no evidence of its presence to-day.

Since 1936, investigations into the epidemiology and control of malaria in Pattukkottai taluk have been proceeding and a number of reports have been published (Russell, Menon and Rao, 1938; Russell, 1938; Russell, Sweet and Menon, 1939; Russell and Rao, 1940). It now seems clear that malaria in Pattukkottai taluk is transmitted principally by *Anopheles culicifacies*, that it dates from 1933-34, and that it is largely due to type of construction of irrigation canals, distributors, and sluice gates, and to the way in which the water is being manipulated both by engineers and ryots. Malaria in this area illustrates what may happen where there is a lack of co-ordination between agriculture, public works and health departments.

Procedure

The surveys were made by two medical officers, who went from home to home seeking information. Sufficient time was allotted so that data could be extracted carefully and intelligently from the people. In Kasangadu, and also in Tuvarangurichchi, one of the medical officers took up residence. For surveying the other villages the medical officers resided nearby. In all five villages they became well acquainted with the inhabitants, treating minor illnesses and gaining full confidence. Repeated visits to some houses were necessary. As far as possible, all data were checked. Figures 1 and 2 illustrate the type of survey card used. The following instructions as to the use of the survey card were given :—

Instructions regarding use of village survey cards

Survey cards are numbered at office.

Houses are numbered by officer conducting survey.

Head of house: refers to chief man living in the house.

Owner : may be other than head of house.

Type of house : mud, thatch, tile, brick, plaster. Brick refers only to burnt brick.

Number of rooms (porches are not counted as rooms).

Humans only : means that no animals were stabled under same roof at night.

Mixed dwelling : means that animals were stabled under same roof at night.

Def. separate : means that animals were under same roof but separated from sleeping persons by a wall.

Floor space and cubic space estimated.

Value : means estimated replacement value.

Religion : Hindu, Moslem, Christian.

Caste: Brahmins, Caste Hindus other than Brahmins, and Harijans (*i.e.*, Hindus without caste, 'untouchables' or 'depressed classes').

Sleeping no. : number of persons usually sleeping in house or on porch.

Wells : report whether sanitary or not, excluding wells used strictly for irrigation.

Screens : refers to wire screen cloth on windows or doors.

Bed-nets : refers to cloth mosquito curtains used at night.

Ann. income : record in rupees after careful questioning. Joint family income in money and produce included. Figure is estimated *total* income for year. Income may include receipts from lands or business situated outside the villages.

Govt. tax : includes land and water taxes. This tax goes to Madras Government and is paid by ryots directly to Government agents. Includes taxes on lands that may be outside the village but owned by the ryots of the village.

Local tax : non-Government taxes paid to zemindars or inamdars. This is primarily a land rent.

Interest : refers to interest payments for debts.

*This paper is based on observations made as a part of the programme of Malaria Investigations, a project under the auspices and having the support of the International Health Division of the Rockefeller Foundation, co-operating with the Health Department of Madras Presidency and the Pasteur Institute of Southern India, in Coonoor. The authors are grateful to Dr. V. P. Jacob and Mr. T. Ramachandra Rao, of the staff of Malaria Investigations, for their assistance.

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Paid treat. fevers : includes so far as possible only the fevers of malaria, as judged by typical symptoms. Includes payments to doctors, quacks, and priests, cost of drugs, sacrifices, and special food.

Days lost : refers only to malaria.

Wages lost : refers only to malaria.

Births and deaths : refers to habitual residents of given house. Cause of death diagnosed by careful questioning by medical officers making survey.

Remarks (Malaya, etc.) : refers to such matters as recent immigration from Malaya, where some of local residents have been employed

MALARIA INVESTIGATIONS - KING INSTITUTE - MADRAS Village Survey Card No.....

Village_____ Date_____ Map Square.....

House No._____ Street : _____

Head of House_____ Owner_____

Head Occupation_____ Owner's Res._____

MEDICAL DATA

Type of House_____	Land owned_____	Ann. Income_____
No. of Rooms_____	Lands on Lease_____	Rent Paid_____
Humans only_____	Religion_____	Govt. Tax_____
Mixed Dwelling_____	Caste_____	Local Tax_____
Def. Separate_____	Sleeping No._____	Interest_____
Floor Space_____	Latrine_____	Total Debts_____
Cubic Space_____	Well_____	Paid Treat. Fevers_____
Value_____	Screens_____	Days Lost_____,,_____
	Bed Nets_____	Wages_____,,_____,,_____

VITAL STATISTICS

Year	Births		Deaths	
	No.	Normal	No.	Cause
1937				
1938				
1939				
1940				
1941				
1942				
1943				

Remarks : (Malaya, etc.)

ANIMAL CENSUS

Species	In House	Around House	Total Owned
Asses			
Buffaloes			
Bullocks			
Cats			
Dogs			
Fowl			
Goats			
Horses			
Sheep			
Swine			
Others			

OCCUPANTS

	Name	Relation	Sex	Age	Remarks
a					
b					
c					
d					
e					
f					
g					
h					
i					
j					
k					
l					
m					
n					
o					
p					
q					

Fig. 1.

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on rubber estates, frequently in malarious areas.

Animal census : 'in house' refers to animals stabled under roof of house at night. 'Around house' may mean anywhere in village, but owned by occupants of the house.

Occupants : list begins with chief occupant, and all relationships are in reference to him. Casual visitors not counted, but guests of three months' residence and servants are included.

Spleen and Blood Examinations

Dates	Spl.	Sm.	Spl.	Sm.	Spl.	Sm.	Spl.	Sm.	Spl.	Sm.	Spl.	Sm.	Spl.	Sm.	Spl.	Sm.	Spl.	Sm.
a																		
b																		
c																		
d																		
e																		
f																		
g																		
h																		
i																		
j																		
k																		
l																		
m																		
n																		
o																		
p																		
q																		

REMARKS:

Fig. 2.

Findings

1. *Population.*—In table I are given population statistics of the five villages surveyed. It will be noted that the greatest population (1,684) was in Kasangadu and the smallest in Senjayakollai (557). These figures refer to actual population as enumerated at time of survey and are not from the official 1931 census. Distribution by sex was fairly equal, each village having a few more females than males, the excess working out to an average of 25.4 per mille of men. As regards age distribution the following percentages for age groups under one year and over 50 years were obtained:—

Place	Under 1 year	Over 50 years
Kasangadu	3.0	9.4
Tuvarangurichchi	3.3	10.7
Senjayakollai	1.1	6.5
Ichchangudi	4.6	11.5
Someswarapuram ..	3.2	13.5

It will be noted (table I) that Senjayakollai was largely a Christian village, the others principally Hindu. Few Muslims were living in any of the villages surveyed. Harijans (depressed classes), towards whose betterment some attention is being paid nowadays, formed a fair proportion of all the four Hindu villages.

2. *Housing and living conditions.*—In table II are given details in respect of houses and related conditions. The houses were predominantly of the mud-wall and thatched-roof variety, but in the delta villages brick and tiled houses were more usual. The average number of rooms per house varied from 1.4 to 2.5 in the five communities, and density of population varied from 4.7 in Ichchangudi to 10.5 Senjayakollai. As will be seen from the table, Senjayakollai houses were considerably larger than those in the other villages, as regards average floor space per house. None of the houses was screened against mosquitoes or other insects; and only 16 persons used bed-nets. No constructed latrines of any sort were found.

Mixed dwellings, *i.e.*, those dwellings in which men and animals were housed under the same roof, were very common. In table III are given particulars of numbers and types of animals found in the villages. Bullocks, goats, fowls, and buffaloes were most common. Relatively more animals were stabled in human dwellings at night in the delta villages than in Pattukkottai taluk. Excluding fowls, the number of animals per person varied from 1.3 in Tuvarangurichchi to 0.4 in Senjayakollai.

There was nothing in the data from the animal census to suggest zooprophylaxis. The highest number of bullocks and buffaloes *per capita* was in Senjayakollai, one of the malarious villages. The lowest number, 0.4, was in the non-malarious village of Ichchangudi.

Clothing was comparatively meagre, males usually wearing only a loin cloth. Females generally had a long saree, the greater length of which was worn around the body from waist

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down, the remaining portion being draped over the shoulders and chest.

The staple diet of the ryots was rice supplemented by millets and some vegetables. Meat

TABLE I

*Population statistics in villages of economic survey, 1939–40**

Population		Pattukkottai taluk			Tanjore delta	
		Kasangadu	Tuvarangurichchi	Senjayakollai	Ichchangudi	Someswarapuram
Totals		1,684	1,381	557	954	690
Males		824	686	276	475	339
Females		860	695	281	479	351
Age groups	0–1 year	51	46	6	43	22
	1–5 years	186	157	56	106	90
	6–12 „	341	277	146	165	95
	13–21 „	252	210	103	121	79
	22–50 „	695	542	210	409	311
	Over 50 „	159	149	36	110	93
Non-Brahmin caste, Hindus		1,474	1,230	15	514	410
Harijans		170	123	11	219	264
Brahmins		13	21	..	138	7
Total Hindus		1,657	1,374	26	871	681
Muslims		4	6	0	0	9
Christians		23	1	531	83	0

*The figures were obtained in a house-to-house census by two medical officers of the staff of Malaria Investigations.

TABLE II

Housing statistics in villages of economic survey, 1939–40†*

Classification	Pattukkottai taluk			Tanjore delta	
	Kasangadu	Tuvarangurichchi	Senjayakollai	Ichchangudi	Someswarapuram
Thatched houses	309	277	50	165	73
Tiled houses	13	9	3	38	53
Total houses	322	286	53	203	126
Total rooms	453	434	133	379	315
Average number of rooms per house.	1.4	1.5	2.5	1.9	2.5
Total floor space (sq. ft.)	224,935	100,965	79,714	88,553	74,326
Average floor space per house (sq. ft.).	698.6	352.0	1,502	436.2	589.5
Total cubic size (cu. ft.)	3,845,739	1,772,711	1,200,510	1,317,191	1,261,581
Average cubic size (cu. ft.)	11,943	6,197.5	22,651	6,488.6	10,012.5
Average cubic space per individual person (cu. ft.).	2,283.6	1,283.7	2,155	1,380.7	1,828.4
Average inhabitants per house	5.2	4.8	10.5	4.7	5.5
Dwellings solely for humans	120	126	36	107	59
Mixed dwellings for humans and animals.	202	160	17	96	67
Number of wells	173	129	7	43	21
Average persons per well	10	11	80	22	33
Bed-nets used	4	1	0	10	1
Value of inhabited houses in Rs.‡ Total	43,176	22,467	15,290	27,459	37,396
Value of inhabited houses in Rs.‡ Average per house.	134/2	78/8	288/10	135/3	299/3

*Figures were obtained by house-to-house census.
†There are no sanitary latrines in any of these villages.
‡An Indian rupee is now equivalent to £0-1-6 or U.S. $0.32. There are 16 annas in a rupee and 12 pies in one anna.

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TABLE III

*Animal census in villages of economic survey, 1939–40**

Classification		PATTUKKOTTAI TALUK			TANJORE DELTA	
		Kasangadu	Tuvarangurichchi	Senjayakollai	Ichchangudi	Someswarapuram
Asses	In house† ..	0	0	0	0	0
	Around house	12	0	0	0	1
	Totals* ..	12	0	0	0	1
Buffaloes	In house ..	8	22	16	96	77
	Around house	217	50	21	57	129
	Totals ..	225	72	37	153	206
Bullocks	In house ..	174	280	107	189	122
	Around house	652	455	274	81	170
	Totals ..	826	735	381	270	292
Cats	In house ..	3	9	7	0	0
	Around house	3	0	0	0	0
	Totals ..	6	9	7	0	0
Dogs	In house ..	0	0	9	9	4
	Around house	38	83	20	0	0
	Totals ..	38	83	29	9	4
Fowl or doves	In house ..	5	0	104	48	0
	Around house	463	626	251	146	98
	Totals ..	468	626	355	194	98
Goats	In house ..	472	440	85	106	109
	Around house	137	140	87	16	9
	Totals ..	609	580	172	122	118
Sheep	In house ..	15	25	6	0	0
	Around house	19	296	213	0	0
	Totals ..	34	321	219	0	0
Others	In house ..	0	0	0	0	0
	Around house	0	0	0	0	0
	Totals ..	0	0	0	0	0
Totals including fowls.	In house ..	677	776	334	448	312
	Around house	1,541	1,650	866	300	407
	Totals ..	2,218	2,426	1,200	748	719
Totals excluding fowl.	In house ..	677	776	230	448	312
	Around house	1,078	1,024	615	154	309
	Totals ..	1,755	1,800	845	602	621
Animals (excluding fowl).	Per dwelling for humans.	5.5	6.3	4.1	3.0	4.9
	Per person ..	1.0	1.3	0.4	0.6	0.9
Buffaloes and bullocks only.	Per dwelling ..	3.3	2.8	7.7	2.1	4.0
	Per person ..	0.6	0.6	1.5	0.4	0.7

* Figures were obtained by house-to-house census.
† The figures for animals 'in house' refer to animals stabled under the same roof with humans at night.
The figures for total animals refer to all which are usually kept somewhere in the village area.

and fish entered only as an occasional factor in their dietary, as such items were costlier than vegetables.

Expenses for lighting were fairly low. A few homes possessed small kerosene lamps, used for a few hours in the evening, but the majority of houses had no lights at all.

3. *Occupations.*—Occupations of the head of families are given in table IV. The group of farmers was largest for all of the villages surveyed except Ichchangudi where labourers predominated and where there was a relatively large number of landlords. The labour there, however, was chiefly agricultural.

4. *Property and income.*—Table V deals with land holdings in the villages and also with income. The average land holding per person varied from 0.19 acre in Ichchangudi to 0.91 acre in Senjayakollai. Income per house from all sources varied from Rs. 345-8-0 in Senjayakollai to Rs. 151-0-0 in Kasangadu. The *per capita* income ranged from Rs. 29-0-0 in Kasangadu to

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TABLE IV

Occupation statistics in villages of economic survey, 1939–40*

Classification	PATTUKKOTTAI TALUK			TANJORE DELTA	
	Kasangadu	Tuvarangurichchi	Senjayakollai	Ichchangudi	Someswarapuram
Actor	8	..	..	..	..
Barber	2	7	1	2	2
Binder	..	1	..	..	..
Blacksmith	3	1	..	1	..
Butcher	..	1	..	..	..
Carpenter	5	1	2	3	2
Cart driver	..	..	..	3	..
Church peon	..	..	1	..	..
Dhoby	8	4	1	1	2
Estate manager	..	1	..	3	..
Farmer	202	135	38	22	45
Goldsmith	1	..	..	1	1
Hotelkeeper	..	3	..	1	..
Key vendor	..	..	..	..	1
Labourer	73	93	8	101	51
Landlord	..	2	..	12	4
Mistry	..	1	..	..	..
Mason	..	..	..	1	1
Merchant (wholesale) ..	10	1	..	1	..
Native doctor	1	1	..	..	..
Oil maker	1	5	..	6	2
Oil vendor†	..	..	..	1	..
Potter	..	3	..	..	1
Sculptor	1	..	..	..	..
Shepherd	..	..	..	1	..
Shopkeeper	1	7	1	2	2
Teacher	3	1	1‡	2	1
Temple priest	..	1	..	7	2
Toddy overseer	..	..	..	1	..
Toddy shopkeeper	1	2	..	..	..
Toddy tapper	1	10	..	13	5
Village karnam§	..	2	..	1	..
„ munsiff§	1	..	1	1	..
„ talayari§	..	1	..	2	..
„ watchman	..	..	..	1	..
No occupation given ..	..	2	..	13	4
Totals	322	286	54	203	126

* Table refers to head of family in each house. Figures obtained by house-to-house census.
† Refers to coco-nut, groundnut, and gingilly oil. A vendor sells it from house to house.
‡ Lives in village only during school year.
§ Munsiff is headman; karnams are assistants to munsiff; talayari is a village peon.

TABLE V

Land ownership and income statistics in villages of economic survey, 1939–40

Classification		PATTUKKOTTAI TALUK			TANJORE DELTA	
		Kasangadu	Tuvarangurichchi	Senjayakollai	Ichchangudi	Someswarapuram
Land owned by population (acres)		1,147	897	508.8	181	364.1
Average land holding per person (acres).		0.68	0.65	0.91	0.19	0.53
Yearly income (rupees and annas).	Total ..	48,820	48,657	18,332/8	39,569	30,295
	Per house ..	151/10	170/2	345/8	194/15	242/6
	Per capita ..	29	35/3	33/14	41/8	44/7
	Per adult over 21.	56/13	69/10	76/11	75/8	74/4
Largest individual income (Rs.)		1,330	3,750	2,000	3,000	9,550
Number of families with yearly income Rs. 50 or more.		306	285	50	193	117

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TABLE VI

Debt and interest statistics in villages of economic survey, 1939–40

Classification		Pattukkottai taluk			Tanjore delta	
		Kasangadu	Tuvarangurichchi	Senjayakollai	Ichchangudi	Someswarapuram
Debts (rupees and annas).	Total ..	90,421	25,001	24,870	25,830	24,337
	Per house ..	280/13	87/4	469/4	127/4	194/11
	Per capita ..	53/11	18/2	45/15	27/1	35/11
	Per adult over 21.	105/5	35/13	104/1	49/5	59/10
Interest paid (rupees and annas).	Total ..	5,616/15	1,485/1	2,314/1	1,549/3	1,461/0

TABLE VII

Taxation statistics in villages of economic survey, 1939–40*

Description		Pattukkottai taluk			Tanjore delta	
		Kasangadu	Tuvarangurichchi	Senjayakollai	Ichchangudi	Someswarapuram
Total Government taxes ..		3,515/4	3,020/4	3,190/8	3,104	3,438/12
Non-Government taxes ..		2,021/8	2,853/4	..	1,029/8	1,448/8
All taxes		5,536/12	5,873/8	3,190/8	4,133/8	4,887/4
Yearly taxes per house (rupees—rounded).		17/0	21/0	60/0	20/0	39/0
Rent paid		..	18/0	1/8	223/12	69/0
Total payments for taxes and debts.		11,153/11	7,376/9	5,506/0	5,906/7	6,417/4
Yearly payments per house ..		35/0	26/0	104/0	29/0	51/0
Government tax collections.†	Total ..	1,876/1	4,517/8§	1,257/7¶	1,838/9/10	1,296/15/7
	Per house‡ ..	6/0	16/0	9/0	9/0/0	10/0/0

* All figures in rupees. *See* footnote in table II. Figures (other than Government collections) obtained by two malaria officers in a house-to-house canvass. Figures per house rounded off in even rupees. *See* text for explanations.

† Includes land and water taxes. Figures obtained by courtesy of taluk officials.

‡ Includes non-Government taxes and payments of interest on debts.

§ Excluding hamlet of Kallikkadu, not included in economic survey.

¶ Figure estimated for Senjayakollai on basis of total for Virakkurichchi of which Senjayakollai is a hamlet.

Rs. 44-7-0 in Someswarapuram. The average *per capita* income for all five communities was about Rs. 35-4-0 per annum. Income in these villages was mainly from agriculture, derived from the sale of produce, and to a considerable extent from wages for agricultural labour. Income from business sources was small. The largest individual income was Rs. 9,550-0-0 in Someswarapuram (high and unusual).

5. *Debts and interest.*—Table VI gives particulars of debts and interest. Debts per house varied from Rs. 469-4-0 in Senjayakollai to Rs. 87-4-0 in Tuvarangurichchi. In the former village and in Kasangadu, total debts per house were greater than total annual income. For all the villages together, average debt *per capita* amounted to Rs. 36-3-0, which slightly exceeds the figure for average *per capita* annual income.

The actual total annual payments as interest on debts are also shown in table VI. These figures do not reveal exorbitant rates as regards interest payments. The percentages which these payments represented in relation to the total debts were as follows :—

	Per cent
Kasangadu ..	.. 6.2
Tuvarangurichchi ..	.. 6.0
Senjayakollai ..	.. 9.3
Ichchangudi ..	.. 6.0
Someswarapuram ..	.. 6.0

But it must be noted that interest payments on debts are usually considerably less than the amounts claimed. Interest in full is seldom paid when it falls due.

6. *Taxes.*—Taxes are considered in table VII. The villages under study were of two kinds in respect of taxation and ownership. In Pattukkottai taluk, Kasangadu and Tuvarangurichchi were *inam* villages and Senjayakollai a Government village. Both villages in the delta were inam villages. An inam village is one in which ownership of the village is vested in a private individual or institution, and the *inamdar* (the

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owner) pays only a nominal tax, called quit rent, to the Government. He receives the land tax (commonly called rent) from the ryots. A Government village is one in which the ryots have a direct relation with the Government and pay their land taxes directly to the Government through village officers. Therefore actual receipts by Government from these two types of villages will vary considerably. In the inam village, the major part of payments on land by ryots is retained by the inamdar, while in the Government village the entire amount goes to Government.

In the present study the aim has been to gather information about actual payments of taxes by the ryots and for this purpose figures in Government records do not give a full picture. A ryot actually pays not only for the land he owns in the particular village in which he lives but also for lands he may own in other villages. Further, there are generally a large number of lands in any village owned and paid for by persons living in outside places. Government and inamdars collect revenue on the basis of the acreage of land actually existing in the particular village. It is important to determine the taxation paid by ryots per head of population rather than the taxation per acre. This gives a better picture of the financial condition of the ryots. Note of this fact has been taken in estimation of income per head of the population, because many persons receive incomes from property or business not actually earned within the limits of their own village. This outside income has been included.

Every ryot pays two kinds of taxes, (1) a land tax paid either directly to Government or to the inamdar or zemindar, based on the area of his holding and the type of cultivation; (2) a special water tax, levied and collected by Government for irrigation water from Government sources (Cauvery-Mettur canals in Pattukkottai taluk, the river and its channels in the delta). The rate per acre will depend on whether a single or a double crop is raised. These taxes have been combined and classified for the sake of simplicity into two main heads, *viz*, (1) Government taxes, *i.e.*, all payments made directly to Government, whether for land or water, and (2) non-Government taxes paid to inamdars, zemindars, or local bodies.

From table VII it can be seen that the total taxation per house varied from Rs. 60-0-0 in Senjayakollai to Rs. 17-0-0 in Kasangadu. The percentages of yearly income per house paid in taxes were as follows :—

		Per cent
Pattukkottai taluk.	Kasangadu ..	11.2
	Tuvarangurichchi	12.4
	Senjayakollai ..	17.3
Tanjore delta.	Ichchangudi ..	10.3
	Someswarapuram	16.1

Combining the total of all taxes and interest paid, the proportions of average income per house which were paid for these two items were as follows :—

		Per cent
Pattukkottai taluk.	Kasangadu ..	23.0
	Tuvarangurichchi	15.0
	Senjayakollai ..	30.0
Tanjore delta.	Ichchangudi ..	15.0
	Someswarapuram	21.0

7. *Vital statistics and malaria rates.*—Birth, death, and infant mortality rates are given in table VIII. These were compiled from official sources and are in line with the survey observations. Birth rates varied from 41.3 in Tuvarangurichchi to 34.4 in Kasangadu. Death rates were as high as 29.0 in Someswarapuram and as low as 16.6 in Virakkurichchi, of which Senjayakollai is a hamlet. The infant mortality was highest in Tuvarangurichchi, where it was 193 per 1,000 live births. It was lowest in Kasangadu at 138 per 1,000 live births.

It will be seen that the two non-malarious villages surveyed had lower birth rates and higher death and infant mortality rates than the three malarious villages. Malaria in Pattukkottai taluk is a new affliction dating only to 1933-34 and prior to this the taluk is said to have been relatively more healthy than the contiguous delta.

In table IX malaria parasite and spleen rates are given. These were obtained in the course of routine epidemiological studies. Usually two surveys a year have been made, one in April or May, during the off-season, and one in October or November, which is the peak of the malaria season. Such surveys in 1939 indicated the total absence of malaria in the Tanjore delta. But Pattukkottai taluk was malarious.

During the 1938, 1939, and 1940 malaria seasons experimental control was obtained in Kasangadu by spray-killing adults (Russell and Knipe, 1939, 1940, 1941). The results are reflected by falling parasite and spleen rates. The village of Tuvarangurichchi, which is some two miles from Kasangadu and similar in all respects, was used as an experimental control, no malaria prophylaxis of any sort being done. It will be seen (table IX) that no corresponding decline occurred there in parasite and spleen rates. In Senjayakollai, in 1938 and 1939, minor engineering control, such as filling borrow-pits, ditching, and using paris-green, was accomplished. Rice fields and field channels were not controlled and the malaria rates subsided less notably than in Kasangadu.

8. *Losses due to fevers.*—Table X gives particulars regarding payments for fevers, and days and wages lost through fevers. Answers given by the people were carefully scrutinized by the medical officers and the figures presented herewith refer only to fevers these officers believe to have been due to malaria. It will be noted that actual payments for fevers were Rs. 2-8-0 *per capita* in Tuvarangurichchi and

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TABLE VIII

*Birth, death, and infant mortality statistics in villages of economic survey, 1937–39**
(Birth, death, and infant mortality rates per mille)

Description	Year	PATTUKKOTTAI TALUK			TANJORE DELTA	
		Kasangadu	Tuvarangurichchi	Virakkurichchi†	Ichchangudi	Someswarapuram
Births	1937	66	‡	19	31	26
	1938	56	56	20	39	23
	1939	51	57	24	31	22
	Average number of live births per 1,000 individuals.	34.4	41.3	38.8	35.6	34.8
Deaths	1937	62	‡	7	18	28
	1938	39	33	10	27	18
	1939	28	37	11	26	14
	Average number of deaths per 1,000 individuals.	25.5	25.3	16.6	25.2	29.0
Infant deaths	1937	12	‡	5	3	7
	1938	7	13	3	6	4
	1939	6	8	2	10	2
	Average infant death rate per 1,000 live births (infant mortality).	138	193	143	176	167

* All figures by courtesy of taluk officials. House-to-house canvass furnished evidence as to general reliability of the figures.

† Senjayakollai is one hamlet of Virakkurichchi for which figures have been given. The averages may be taken as typical for Senjayakollai.

‡ Figures not available.

Re. 1-6-0 in Kasangadu. There was no malaria in the delta villages and therefore no figures are given for payments or days lost due to fevers. In Senjayakollai adequate information in this regard was not obtained. *Per capita* wages reported lost by fevers were Re. 1-6-0 in Tuvarangurichchi and Re. 0-12-0 in Kasangadu. The *per capita* days lost due to fevers were 4.9 in Kasangadu and 10.5 in Tuvarangurichchi. The days lost per adult member of the population during the previous year were 9.7 and 20.7 respectively.

Table XI was prepared from a survey of some labourers working on the malaria control project in Senjayakollai. These labourers live in one hamlet of Virakkurichchi, of which Senjayakollai is another. It will be seen that illness costs on the average per week Rs. 3-7-6 for a man, Rs. 4-5-0 for a woman, and Re. 1-10-8 for a child in this area. The largest items of expense were for travel, offerings, and temple sacrifices of fowls, sheep or goats. Temple and church candles cost Re. 0-0-9 each and generally one to three will be purchased during such an illness as an attack of malaria. The table does not include loss of wages, which for men would average about Re. 0-6-0, for women Re. 0-4-0, and for children over 12, Re. 0-2-0 per day. A week's illness would probably mean a loss to an adult male labourer of at least Rs. 2-0-0 wages *plus* Rs. 3-7-8 extra expense.

Discussion

A. *General.*—Before proceeding to discuss the economic burden of malaria in these villages, some basic findings of this survey may be compared with those of other surveys. Birth rates in the villages surveyed were about the same as those for Madras Presidency and a little higher than British India. Death rates were a little higher. Infant mortality rates were about the same as for British India and a little lower than for Madras Presidency. The following rates show these and other comparisons :—

	Birth rate	Death rate	Infant mortality rate
Three Pattukkottai taluk villages surveyed.	38.2	22.5	158
Two Tanjore delta villages surveyed.	35.2	27.1	172
Average all five villages surveyed.	37.0	24.3	163
British India (1937) ..	34.5	22.4	162
England and Wales (1937)	14.9	12.4	58
Federated Malay States (1937).	37.8	19.9	147
Madras Presidency (1937)	36.0	22.3	170

Note.—Figures other than for surveyed villages taken from the 1937 report of Public Health Commissioner (Russell, 1939). For surveyed villages, figures are averages from table VII.

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TABLE IX

Malaria parasite and spleen rates in villages of economic survey, 1937–39

Village	Year	Season*	Parasite rate	Spleen rate
Kasangadu†	1937	Off	38	42
	1937	Malaria	57	68
	1938	Off	40	41
	1938	Malaria	12	24
	1939	Off	4	9
	1939	Malaria	6	15
Tuvarangurichchi‡	1937	Off	35	43
	1937	Malaria	45	55
	1938	Off	37	41
	1938	Malaria	52	61
	1939	Off	33	48
	1939	Malaria	48	57
Senjayakollai§	1937	Malaria	42	48
	1938	Off	28	33
	1938	Malaria	31	44
	1939	Off	33	12
	1939	Malaria	32	26
Ichchangudi¶	1939	April	0	0
	1939	November	0	0
Someswarapuram¶	1939	April	0	2
	1939	November	0	2

* In Pattukkottai taluk the malaria season extends from July to the following January.
† Malaria control by spray-killing adult mosquitoes was carried out in Kasangadu in 1938 and 1939, hence the fall in rates.
‡ No control measures have been carried out in Tuvarangurichchi, which furnishes a suitable contrast village to Kasangadu.
§ Malaria control by minor engineering measures was carried out in Senjayakollai in 1938 and 1939 and resulted in some decrease in rates.
¶ Ichchangudi and Someswarapuram are in a portion of the Tanjore delta where there is no evidence of malaria.

TABLE X

*Expense of fevers in villages of economic survey, 1939–40**

Classification		Pattukkottai taluk			Tanjore delta	
		Kasangadu	Tuvarangurichchi	Senjayakollai	Ichchangudi	Someswarapuram
Payments for fevers yearly.	Total ..	2,298	2,819	†	*Nil*	*Nil*
	Per house	7/2	9/13	†	,,	,,
	Per capita	1/6	2/8	†	,,	,,
	Per adult over 21.	2/11	4	†	,,	,,
Days lost through fevers yearly.	Total ..	8,307	14,449	†	*Nil*	*Nil*
	Per house	25.8	50.5	†	,,	,,
	Per capita	4.9	10.5	†	,,	,,
	Per adult over 21.	9.7	20.7	†	,,	,,
Wages lost by fevers yearly.	Total ..	1,276	1,964	†	*Nil*	*Nil*
	Per house	4	6/14	†	,,	,,
	Per capita	-/12	1/6	†	,,	,,
	Per adult over 21.	1/8	2/13	†	,,	,,

* Enquiries regarding fevers were directed to obtain evidence of actual attacks of malaria, as manifested by typical symptoms. Figures in rupees. *See* footnote table II. Figures obtained in house-to-house canvass by two malaria officers.
† Questioning insufficient, information inadequate.

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TABLE XI

*Average cost of illness for individuals of labouring class in Virakkurichchi, April to June 1940**

Description	Cost of medicine	Cost of medical attendance	Cost of special food	Other incidentals like travel and offerings to God	Total expense incurred	Average expenditure per individual	Average duration of illness per individual in weeks	Average expense per head per week
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.		Rs. A. P.
Man								
Expenses incurred by 32 men for 48 weeks of illness.	23 8 0	35 9 6	44 2 0	63 6 0	166 9 6	5 3 3	1.5	3 7 6
Woman								
Expenses incurred by 32 women for 40 5/7 weeks of illness.	36 1 6	40 11 0	44 7 0	54 2 0	175 5 6	5 9 8	1.3	4 5 0
Child								
Expenses incurred by 30 children for 25 weeks of illness.	12 2 0	10 2 0	12 2 6	10 7 0	44 13 6	1 7 11	0.8	1 10 8

*Amounts are given in Indian rupees. *See* footnote in table II.

The density of population per house in the five communities surveyed agrees with figures calculated from Government census figures of 1931, which were 5.3 per house in Pattukkottai taluk and 5.1 per house in Papanasam taluk.

As regards annual income, Sinton (1935) quoted the following estimates of average annual income per head of population in India :—

Lord Curzon ..	1901	Rs. 30	
Sharma	1911	„ 86	
Horne	1918	„ 42	
Slater	1918 over	„ 70	for Madras Presidency.
Shah	1921–22	„ 46	
Simon Commission ..	1928	„ 110	
Visweswaraya ..	1933	„ 60	
Joshi	1933	„ 53	
Hindustan Times ..	1934	„ 45	

Incomes *per capita* in the surveyed villages varied from Rs. 29-0-0 to Rs. 44-7-0, averaging Rs. 35-4-0, which is somewhat less than the estimates above and much less than that given by Slater for Madras Presidency in 1918. The average agrees more closely with an estimate of Rs. 39-0-0 *per capita* for rural dwellers in India, made by Singh (1940).

Shirras (1937) gives the following figures for *per capita* annual income in British India by years :—

Year	*Per capita* INCOME	
	Rupees	£ Sterling
1871	20	2.0
1881	27	2.7
1901	30	2.0
1911	80	5.3
1921	119	8.8
1924	126	9.5
1925	114	8.5
1927	108	8.1
1931	63	4.7
1932	58	4.4

Shirras (1937) also gives some figures for *per capita* annual incomes in other countries for comparison with India, as follows :—

Country	Year	*Per capita* income, £ Sterling
United Kingdom	1931	76
Canada ..	1927	119
Bulgaria ..	1932	9
Russia ..	1925	10
U. S. A. ..	1932	89
Japan ..	1925	14
Italy ..	1927	24

There was obviously a steep decline in incomes in India from 1924 to 1932. It is possible that there has been a further decline since then. It is also obvious that the *per capita* income in India is low as compared with other countries.

It is also interesting to compare tax figures from several countries with those in India. Shirras (1937) gives the following figures to show what percentage of national income is paid out for total taxes :—

Country	Year	Percentage of income from taxation
India	1932–33	10.1
United Kingdom	1931–32	25.6
Canada	1927	9.5
U. S. A.	1932	18.5
Japan	1925	12.8
Italy	1927	22.3

From the income and percentage of taxation figures of Shirras, already given, one can

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construct a table of net income, *i.e.*, income less taxation, as follows :—

Country	Year	Net income, £ Sterling
India	1932	3.96
United Kingdom ..	1931	56.54
Canada	1927	107.7
U. S. A.	1932	72.54
Japan	1925	12.21
Italy	1927	18.65

Although the actual percentage of taxation in India is less than that in such countries as the United Kingdom and the United States of America, yet the net *per capita* income remaining in India is very low. When it is realized that from this net residue a further deduction has to be made for interest on debts with which practically every rural dweller is burdened, it becomes apparent that not much is left to the ryots themselves to pay for such 'luxuries' as malaria control, however good a financial investment it could be proved to be.

Sinton (1935) stated that from figures given by various workers it did not seem to be an over-estimation to consider that the average earning capacity of an adult male in India was Rs. 10-0-0 per mensem and of a female Rs. 5-0-0, the term adult referring to those between the ages of 15 and 50. The average annual income per adult above 21 years in the area surveyed ranges between Rs. 56-13-0 in Kasangadu and Rs. 74-4-0 in Someswarapuram. On the basis of the present study and from general experience in this area it seems likely that monthly averages are of the magnitude of Rs. 6-0-0 or Rs. 7-0-0 per adult male and about Rs. 4-0-0 per adult female among the rural population. As regards wages and days lost, it may be noted that it is customary for a mother to remain at home when her child is seriously ill.

B. *Economic burden of malaria.*—The direct losses to an individual, as a result of attacks of malaria, are chiefly :—

(*a*) loss of wages, if a labourer, or loss of working days on the crops, if a farmer;
(*b*) payments for treatment and special food;
(*c*) payments for temple and church offerings.

The indirect losses are :—

(*a*) loss of efficiency and hence of earning power;
(*b*) reduction in expectation of life.

It is difficult to assess accurately the money losses due to malaria. The residents of the villages surveyed were questioned very carefully regarding amount paid for medicines and doctors, and for other expenses in connection with malarial fevers. The individual estimates make fairly large totals in Kasangadu and Tuvarangurichchi, as shown in table X. In Tuvarangurichchi, where no malaria control has been done, the *per capita* payment for fevers amounted to Rs. 2-8-0 and the estimated wages lost *per capita* was Re. 1-6-0, making a direct total loss of Rs. 3-14-0 *per capita* per annum.

King quoted by Sinton (1935) estimated in 1911 in Madras that during an illness lasting 14 days, the cost of extra necessaries and food, medical attendance, medicine, etc., in the case of an adult of the lowest labouring class, was Rs. 2-0-0 and of a child Re. 1-8-0. In view of the increased cost of living since 1911, these figures are comparable to those given in table XI.

No account is taken in the above calculation of the indirect losses due to anæmia. Since there is very little use made of antimalaria drugs, relapses and chronic debility are common and no doubt reduce the yearly income. It is interesting in this connection that the average *per capita* income for the three malarious villages was Rs. 32-0-0 and for the two non-malarious villages Rs. 45-0-0. Of course, it is illogical to say that this difference was entirely due to malaria because other possible causes could be suggested, as for example, the greater fertility of the delta lands and therefore greater yield of grain. In fact, double crops are the rule in the delta but the exception in the Pattukkottai villages surveyed. The latter villages are still in process of conversion from dry to wet lands and are not completely developed.

But the two groups of villages are almost the same racially and socially, and no doubt malaria must be one of the factors accounting for the difference in *per capita* incomes. The rate of development following the new irrigation scheme has no doubt already been retarded by malaria in Pattukkottai taluk.

Sinton (1935) analysing the extensive data available to him stated that in India it would appear to be a conservative estimate to assume that the number of adult days lost per head of malaria-infected population each year at least equals half a month. The figures of the present survey do not differ greatly from Sinton's estimate. The combined average for Kasangadu and Tuvarangurichchi works out at 14.7 days per adult over 21 years of age.

As regards funeral expenses, malaria by lowering the expectation of life and by taking heaviest toll from the young, adds an increased burden for it removes many individuals before they have had time to contribute towards their own funeral expenses. Such expenses probably average from Rs. 12-0-0 per adult to Rs. 4-0-0 per child in the area surveyed.

Sinton (1935) stated that data available suggested that in an Indian population the loss of efficiency among malaria-infected persons may be at least as high as 25 per cent. An individual constantly suffering from attacks of malaria cannot hope to keep fixed employment. A ryot who is frequently ill during the crop season, and in Pattukkottai this coincides with the malaria season, is apt to produce less and consequently to suffer financial loss.

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C. *Economics of malaria control.*—The question arises, whether or not the communities under study can afford to control malaria at their own expense. From the strictly economic point of view there seems no doubt that these villages could spend at least Re. 1-0-0 *per capita* per year for malaria control and, if the control measures succeeded, they would be financially better off, not to mention indirect gains which would doubtless be considerable. In Tuvarangurichchi, for example, the total loss due to payments for fevers and to wages not received amounted to Rs. 4,783-0-0, an average of Rs. 3-14-0 *per capita*. Malaria in this village could be controlled by spray killing at a cost of about Re. 0-4-0 *per capita* per year (Russell and Knipe, 1941). There is no doubt that this village by controlling malaria would be better off to the extent of about Rs. 3-10-0 *per capita* per year.

One frequently reads that rural communities in the tropics cannot themselves afford to control malaria. This may be true in South India as regards malaria control by traditional methods of screening, drug prophylaxis, ditching, paris-greening, and oiling. Costs for such measures in rural communities have seldom fallen below Rs. 2-0-0 annually *per capita* and have usually been higher. But newer methods are being developed. For example, in some experiments in the area of our economic survey in Kasangadu, where there are innumerable breeding places in wells, pits, rice fields, canals, and channels, malaria has been controlled by spray-killing adult mosquitoes at an annual *per capita* cost of Re. 0-7-2 (Russell and Knipe, 1941). Using Indian-grown pyrethrum in another village in the same area the cost was Re. 0-4-7 *per capita* per season.

In Ennore, another Madras rural area where breeding places are largely pools, it was suggested, on the basis of experimental evidence, that control could be obtained by use of *Gambusia* fishes at costs around Re. 0-5-10 *per capita* per year (Russell and Jacob, 1939). In this same area other experiments indicated that by a cheap method of spreading paris-green, control might be obtained at cost around Re. 0-1-5 *per capita* per year (Russell and Jacob, 1939*a*).

But it seems highly improbable that villages having already so relatively high a burden of debt and taxes, and having net annual incomes *per capita* that average only £2-4-0 (or about U. S. $10 to 16), could ever be persuaded voluntarily to add to their tax another rupee for what to them would seem doubtful gains. The consensus of opinion among local officers is that unless malaria could be controlled for about two annas *per capita* per year, there would be little hope of raising the cost from the villagers affected. Even two annas could be obtained only with difficulty from the ryots themselves.

Undoubtedly, the provincial government that collects the land and water taxes and that makes a profit from the sale of irrigation water, has a definite obligation as regards malaria control in the villages surveyed, for malaria in this area is due to *A. culicifacies* which breeds chiefly in irrigation water, standing or running, in canals, channels, borrow-pits, rice fields, and wells (Russell, 1938). The water for which the ryots are taxed, and which may bring agricultural benefit to them, has also brought malaria. But although the Government has a definite liability apart from and beyond its normal responsibility for the health of the people, it is doubtful if it would or could put up a rupee *per capita* per year for malaria control in every malarious village. This would require an annual budget for malaria control of over Rs. 2,50,000 in Pattukkottai taluk alone, which is several times the total annual medical and health budget in this area at present. So that, however much one might emphasize that actually malaria in Pattukkottai taluk costs the people more than its control would cost, the chances of getting Re. 1-0-0 *per capita* for malaria control, either by direct taxation or by an annual grant, are practically *nil*.

But now that costs of control have been lowered to about one-quarter of a rupee there should be a real possibility that by joint effort between the local and provincial governments, by co-ordination of agriculture, public works and health departments, and by active co-operation of the ryots, malaria could be controlled. One logical step that could be taken immediately would be for the provincial government to set aside each year for malaria control a percentage of the irrigation tax.

A much more active and effective liaison between health, public works and agricultural departments is urgently required not only to correct the present prevalence of man-made malaria but to prevent the creation of similar hazards in the future.

Conclusions

In conclusion, it appears that even in a sparsely settled agricultural community in the tropics it costs less to control malaria (by newer methods) than it does to pay the direct financial losses due to this disease, not to mention the considerable indirect losses. But it also appears that there is little hope of obtaining from the very small residue of income that remains to the local inhabitants, after they have paid their taxes and interest on debts, an extra tax for the control of malaria. Yet it would seem that there is a possibility of achieving control of rural malaria in the area surveyed at costs which would be financially feasible, provided that the provincial government was willing to forego a fraction of the income received from water taxes and would apply this to the task of correcting a situation for which it is largely responsible and provided also that effective co-operation was maintained between agriculture, public works and health departments.

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Summary

A house-to-house survey in three malarious and two non-malarious villages in rural areas of Tanjore District, Madras, revealed the following facts regarding the social and economic condition of the population :—

1. The actual populations of the villages at the time of the survey were as follows :— Kasangadu 1,684, Tuvarangurichchi 1,381, Senjayakollai 557, Ichchangudi 954, and Someswarapuram 690. The first three were malarious, the latter two non-malarious.

2. Sex and age ratios were normal, although females were slightly in excess of males in each of the villages.

3. Density of population per house varied from 4.7 to 10.5.

4. Birth rates varied from 34.4 to 41.3, death rates from 16.6 to 29.0, and infant mortality rates 138.0 to 193.0 per mille. These were typical of the locality.

5. The chief occupation was farming.

6. None of the houses were screened, bed-nets were rare, and no constructed latrines of any kind, sanitary or otherwise, were found.

7. The average land holding per person varied from 0.19 to 0.91 acre.

8. The number of cattle per person varied from 0.4 to 1.5. There was no evidence of zooprophylaxis in any of the villages.

9. Income from all sources varied between Rs. 29-0-0 and Rs. 44-7-0 *per capita* per annum and averaged Rs. 36-13-0. It ranged from Rs. 151-10-0 to Rs. 345-8-0 per house.

10. Total taxes paid varied between 10.3 and 17.3 per cent of total annual income per house.

11. Total debts varied between Rs. 18-2-0 and Rs. 53-11-0 *per capita* and the average rate of interest paid ranged between 6.0 and 9.3 per cent. The total payments per annum for taxes and debts varied from 15 to 30 per cent of the annual income per house.

12. In two malarious villages, days lost due to fevers averaged 4.9 and 10.5 *per capita* per annum. Payments for malarial fevers averaged Re. 1-6-0 and Rs. 2-8-0, and wages lost Re. 0-12-0 and Re. 1-6-0 *per capita* per annum in two villages.

13. The bearing of these facts on the financial aspect of malaria control has been discussed and it is concluded that the direct financial loss due to malaria is considerably more than the amount it would actually cost to control this disease. There would seem to be no possibility, however, of inducing ryots to pay a special malaria tax out of the very small residue of income remaining when they have paid taxes and interest on debts.

14. Since malaria in this area springs chiefly from irrigation water, it would seem reasonable to expect Government to set aside annually a percentage of the irrigation tax for malaria control.

15. There is urgent need as regards malaria control for more effective co-operation between agriculture, public works, and health departments.

REFERENCES

RUSSELL, A. J. H. (1939). *Ann. Rep. Pub. Health Commissioner, Govt. of India*, 1937. Manager of Publications, Delhi.

RUSSELL, P. F. (1938) .. Malaria due to Defective and Untidy Irrigation. *J. Mal. Inst. India*, **1**, 339.

RUSSELL, P. F., and JACOB, V. P. (1939). Some Experiments in the Use of Fish to Control Anopheles Breeding in Casuarina Pits. *Ibid.*, **2**, 273.

Idem (1939*a*). Some Experiments with a Cheap Method of Treating Casuarina Pits with Paris Green to Control Anopheles Breeding. *Ibid.*, **2**, 261.

RUSSELL, P. F., and KNIPE, F. W. (1939). Malaria Control by Spray-killing Adult Mosquitoes. *Ibid.*, **2**, 229.

Idem (1940). Malaria Control by Spray-killing Adult Mosquitoes. *Ibid.*, **3**, 531.

Idem (1941). Malaria Control by Spray-killing Adult Mosquitoes. *Ibid.*, **4**, 181.

RUSSELL, P. F., MENON, M. K., and RAO, T. R. (1938). Epidemiology of Malaria in Pattukkottai Taluk, Tanjore District, Madras Presidency, India. *Ibid.*, **1**, 285.

RUSSELL, P. F., and RAO, T. R. (1940). On Habitat and Association of Species of Anopheline Larvæ in South Eastern Madras. *Ibid.*, **3**, 153.

RUSSELL, P. F., SWEET, W. C., and MENON, M. K. (1939). Some Observations on Malaria Parasite Rates in Infants in South India. *Ibid.*, **2**, 439.

SHIRRAS, G. F. (1937). *Poverty and Kindred Economic Problems in India.* Govt. of India, Home Department, H.D. 14, New Delhi.

SINGH, N. N. (1940) .. India's Poverty. *Indian Affairs*, 1st Aug., p. 56.

SINTON, J. A. (1935) .. What Malaria Costs India, Nationally, Socially and Economically. *Rec. Mal. Survey, India*, **5**, 413.

Current Topics

The First-Aid Treatment of Burns

By A. B. WALLACE, M.SC., M.B., F.R.C.S.Ed.

(From the *Practitioner*, Vol. CXLVII, August 1941, p. 513)

THIS subject is of great importance. As a result of the present lack of uniformity in advice a patient may suffer from well-intentioned but misdirected procedures. Some general principles of first-aid organization may be useful:

(*a*) To notify the first-aid post, hospital, medical officer, or police by the quickest method—telephone, messenger, warden—and to arrange for conveying the patient.

(*b*) To give all possible help to the medical officer and police, and to follow instructions implicitly.

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(*c*) To decide quickly whether the initial treatment should be for the injury or for shock.

RESCUE PROCEDURES

As a result of the frequent use of incendiary and high-explosive bombs many emergencies will confront the populace, who must be in a state of preparedness. There is, as a rule, only one opportunity: that of the moment.

(1) *Patient trapped in a burning room.*—The patient may have collapsed from inhalation of smoke, or be poisoned by carbon monoxide. Quick removal of the patient will be necessary to save his life. The first-aid worker applies his gas mask or ties a handkerchief soaked in water (or vinegar one part and water three parts) around his nose and head, so that the broad part covers his nose and mouth. After taking several deep breaths he crawls along the floor of the room, seizes the patient and pulls or carries him to safety, and if necessary applies artificial respiration. In a serious case the hospital, first-aid post, or police is notified immediately, and the need for a cylinder of oxygen with 5 per cent carbon dioxide indicated.

(2) *Patient with clothes on fire.*—Since flames ascend, the patient is laid down—forcibly if necessary with the flames uppermost—and these are smothered with a coat, rug, or blanket rather than extinguished by water. Treatment as for a burn is then carried out.

(3) *Patient with electric shock and/or burn.*—A summary of the 'Electrical Review's' suggestions for dealing with electric shock is given:—

In many cases when persons receive electric shocks, death is only apparent. With the prompt application of first aid, practically every victim can be revived. The method of resuscitation resorted to is artificial respiration. Steady persistent effort is one of the essential conditions of successful attempts to restore animation. In cases of severe shock, respiration is seldom established under one hour, and three hours may be necessary to restore normal breathing. Artificial respiration is not stopped until the patient breathes normally or until a medical practitioner has pronounced life extinct. The electric circuit is broken at once if there is an interrupter close at hand; if not the body must be removed as soon as possible from contact with the live conductor. The body must not be touched with the hands unless protected by india-rubber gloves. If these are not available, the patient can be pulled off the live conductor by his coat tail, if his clothes are not wet, or pushed off the wires with a broom handle. The rescuer, for additional precaution, can stand on a dry board or on a thick newspaper or bundle of sacking, or he can charge the body with the shoulder.

Once the body is pulled from the live conductor the case is treated as one of drowning. The patient is placed face downwards on a dry mattress. Schafer's method of artificial breathing is begun and continued at a rate of fifteen times a minute until natural breathing is established. If help is available, loosen any tight clothing about the neck, chest, or waist, but do not stop artificial respiration in order to do so.

The efforts to restore breathing must be carried out with perseverence, as in some cases it has been restored after a long period of apparent death. During the procedures the patient must be kept warm. Circulation may be aided by rubbing the body, or striking it with a wet towel. An assistant may strike the patient's shoe heels with a stick some twenty times at intervals of five minutes. When it is possible to procure a cylinder of oxygen, inhalation may be attempted if administered under medical supervision. Stimulants should not be administered unless ordered by a medical practitioner. If one is not present, a teaspoonful of sal volatile in a small glass of water may be given if the patient can swallow. The patient must not be moved until his breathing has returned to normal without assistance.

(4) *Patient with scalds from burst steam boilers or pipes.*—These may result from the bombing of factories and hospitals in which steam is necessary to carry out the daily work. It must be arranged that in the event of an emergency the steam can be turned off at a moment's notice.

The following points must be attended to in the general examination:—

(*i*) The nature of the case is determined before applying treatment.

(*ii*) If there is doubt whether the patient is alive or dead, the patient is treated as if he were alive.

(*iii*) When possible the history and symptoms of the case are ascertained, but no undue delay is permissible.

(*iv*) The patient is examined quickly and gently. *Clothing must not be removed to expose any burned surface.*

GENERAL POINTS IN TREATMENT

(*a*) Treatment is instituted immediately, and if necessary the first-aid post or hospital is notified.

(*b*) Shock must be prevented if possible.

(*c*) The first-aid student must carry out his duties in such a way that the patient is relieved of danger and pain, but he must bear in mind the limitations of his knowledge, and that he must not take upon himself the responsibilities of a medical practitioner. While first aid is being rendered the worker must consider also:—

(1) *How the patient is to be carried or lifted.*—He may be carried pick-a-back or by the fireman's lift or, if a second person be present, by the four-handed seat.

(2) *If a stretcher is necessary.*—If so, how can this be improvised or secured?

(3) *The method and provision of transport.*—By horse-drawn vehicle, car, or motor ambulance.

(4) *Where the patient is to be taken.*—If facilities and conditions in the first-aid post do not approximate to that of a hospital out-patient department, all cases of burns no matter the extent are referred directly to the nearest hospital. In all circumstances extensive burns are taken to hospital without delay. If the burn is of the size of the front of the hand or less, the patient can be taken to a first-aid post, unless the burn involves the hand itself or the face. All cases of burns of these regions, unless very trivial, are taken to hospital.

The complications of burns are shock, which accounts for 80 per cent of deaths, sepsis, local œdema and residual deformities. The two of special significance to the first-aid worker are shock and sepsis, and his efforts are directed to the control of both.

Pain, loss of heat and loss of fluid predispose to shock, and these should be prevented or at least minimized. Factors predisposing to infection are the presence of organisms in the skin; contamination of the injured surface from dirt, clothes, dressers and dressings; the presence of foreign bodies; the application of a coagulating substance before proper cleansing; and the application of substances which make later cleansing difficult, *e.g.*, baking powder, flour, oils, petroleum jelly, antiseptics, such as picric acid and gentian violet.

PRINCIPLES OF FIRST-AID TREATMENT IN BURNS

General.—The patient is wrapped in blankets which are placed both below and over him. Protected hot-water bottles can be used as a source of additional warmth; they are placed outside the covering blanket. Hot sweetened tea is given to help to replace the lost fluid. If a medical officer accompanies the first-aid party he administers, if necessary, an injection of morphine, ¼ grain to an adult. The time of injection and dose are noted, and sent to the hospital with the patient. In carbon monoxide poisoning, oxygen combined with 5 per cent carbon dioxide must be administered by the medical attendant.

Local.—Any exposed burn is covered with a clean sheet, clean cloth, or sterile towel. In certain circumstances a first-aid application is indicated, *e.g.*, an airman who receives a burn on an operational flight, or a sailor burned at sea. In civil life the necessity seldom occurs. The essentials of a suitable first-aid dressing are to allay pain, to control œdema, to control infection, and to be miscible with water, so that when the patient arrives at hospital the substance can be removed readily and the dressing of choice applied.

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Recently a glycerine-sulphonamide paste containing 5 per cent albucid has been described (Robson and Wallace), albucid is a water-soluble sulphonamide. Investigations are continuing, and the form at present favoured is a cream consisting of 30 per cent albucid soluble in glycerine (75 parts) and water (25 parts) mixed with sufficient eucerine to form a smooth cream. If preferred, the 30 per cent solution can also be made into a paste with kaolin. The paste can be carried in tins or tubes and applied directly to the affected part. It would appear to be useful for applying to burns received in action several hours or days before medical care is possible.

First-aid treatment of burns of special parts

(1) *Eyes. Caustics.*—The excess must be removed and immediate flushing with water is the best treatment.

Acids and alkalis.—If neutralizing solutions are available, wash out: (*a*) Acids with bicarbonate of sodium, 1 teaspoonful to a pint; and (*b*) alkalis with milk or 2 per cent boracic acid lotion. If these solutions are not to hand, wash out with water *without delay.*

Lime.—(1) Wash out the eyes with tepid normal saline, or with water if the latter is not available. (2) Evert the upper eyelids and remove any lime which may be, and in fact so often is, adherent to the under surface of the lid. (3) Instil a few drops of liquid paraffin or olive oil.

(2) *Eyelids.*—Smear with petroleum jelly or cold cream.

(3) *Nostrils.*—Smear with petroleum jelly or cold cream.

(4) *Ears.*—Plug with cotton-wool coated with sterile petroleum jelly; smear with petroleum jelly or cold cream.

(5) *Lips and mouth.*—Smear with petroleum jelly or cold cream.

(6) *Throat.*—This may be burned when the patient has been exposed to boiling water or steam. Apply to the neck a towel wrung out of hot water; give sips of cold water; get oxygen with 5 per cent carbon dioxide for inhalation.

Chemical burns

Corrosives.—The general principle is to dilute with large quantities of warm normal saline or water and to remove any contaminated garments. Chemicals are quickly fixed in the tissues, and attempts at neutralization are unnecessary. However, if the burn is seen early, the following measures may be of benefit:

Acid burn.—Bathe in alkaline solution (a dessertspoonful of washing or baking soda to one pint of water; ammonia or fluid magnesia can also be used).

Alkaline burn.—Bathe in weak acid solution (equal parts of vinegar and water).

After neutralization in both types, the lesion is treated as an ordinary burn.

Blister gas burns

In the event of exposure to gas or vapour, gas masks are applied at once: if the irritation is serious and does not stop after a time, patients are taken to the nearest A.R.P. warden or member of a first-aid party. In patients suffering from liquid blister gas the liquid is dabbed, *not wiped,* off the skin with a handkerchief, then 'No. 2 anti-gas ointment' is rubbed well into the place. The handkerchief *must* be destroyed. If the ointment is not at hand, it can be obtained at the nearest chemist's shop. The ointment should be applied *within* five minutes of exposure. If this is impossible, wash at once with warm water. Take off any splashed outer garment *at once.* (Adapted from 'What to do about Gas' issued by the Ministry of Home Security.)

Other burns

Electric burns.—Treat as an ordinary burn.

Phosphorus burns.—The affected part is immersed in water; then a thick pad soaked in water is applied, and the patient is sent to hospital at once. Oils or greasy dressings *must not be applied.*

Chemotherapy versus Combined Chemotherapy and Serum in the Treatment of Pneumonia

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(Abstracted from the *Journal of the American Medical Association,* Vol. CXVI, 24th May, 1941, p. 2366)

THE universal acceptance of the value of sulphonamide therapy in pneumonia has left the rôle of serum as the major current problem in the treatment of this disease. Will the use of serum combined with drug reduce still further the fatality rate? Will it cause a more rapid subsidence of the acute infectious process? These problems have been studied at Bellevue Hospital by using the alternate case method. Since February 1939, all pneumonia patients entering the wards of the First, Second and Fourth medical divisions have been alternated within the pneumococcus types between sulphonamide therapy alone and combined drug and serum therapy. In the present study we are reporting the results up to 1st January, 1941, in a series comprising 607 patients thus alternated.

Method

As soon as the clinical diagnosis of pneumonia was made, samples of blood and sputum were collected for bacteriologic study. The patient was then immediately placed on sulphonamide therapy without waiting for the results of typing. When the pneumococcus type was obtained, alternate patients in each type were placed in either the drug alone or drug plus serum group. If the patient fell in the drug plus serum group he was given, in addition to the drug, concentrated anti-pneumococcus rabbit serum. This was administered as soon as the specific type was obtained except when striking clinical improvement already had occurred and serum no longer would be of value. These patients, however, were left in the 'drug-plus-serum' group because to remove them would create a statistical error in favour of the drug-alone series. The first therapeutic dosage of serum was usually 100,000 units in uncomplicated cases and 200,000 units or more for known bacteremic or seriously ill patients. This dosage was repeated when necessary. Six patients who would have been due for serum survived less than twenty-four hours and died before typing was completed. These patients, therefore, received no serum but were necessarily counted in the serum group, it being one of the inherent disadvantages of serum therapy that there usually is some delay before serum can be started even under ideal circumstances. With the exception of these six twenty-four hour deaths, all other patients in the serum group who died received serum.

Several different sulphonamide drugs were used during the course of this study: sulphapyridine, dextrose-sulphapyridine, sodium sulphapyridine, sulphathiazole, sulphamethylthiazole and sulphadiazine. When a new drug was introduced, one or more whole wards were shifted from one drug to the other, and all patients entering these wards were treated with the new drug without interfering with the alternation of cases between the drug alone and the combined therapy groups. There was an occasional failure of response, and occasionally a maintenance dose higher than 1 gm. every four hours was used. A few patients received sodium sulphapyridine intravenously either to obtain a more rapid absorption or to procure a higher blood concentration of the drug.

Other forms of treatment including oxygen therapy, procedures for maintaining an adequate fluid intake, sedation and various symptomatic measures were used as indicated in both groups of cases.

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This study included cases of both lobar pneumonia and bronchopneumonia. No patients were excluded except those with atypical congestive bronchopneumonia terminating some otherwise fatal disease such as carcinoma or heart disease. All other cases of pneumonia were included: systemic disease, no matter how serious, did not disqualify patients. A complete bacteriologic study was carried out in all cases; throat swab cultures were made when sputum was not obtainable; typing was repeated in all of the higher types and whenever the results were not conclusive; typing from the peritoneal exudate and from the brain of the mouse was used to supplement and confirm the findings in every case; admission blood cultures were always procured and repeated when indicated; chest fluid or any other specimen from a localized process obtainable either ante mortem or post mortem was sent to the laboratory for study. In addition almost every patient had at least one roentgen examination, blood counts, urinalyses and blood chemistry determinations, particularly the sulphonamide drug concentration.

SUMMARY AND CONCLUSIONS

1. A series of 607 cases of pneumococcic pneumonia was alternated in treatment, by type, between chemotherapy and combined chemotherapy and serum therapy.

2. The fatality rate in the drug-alone group was 9.3 per cent and in the drug-and-serum group 9.8 per cent. The fatality rates were 11.1 per cent and 14.6 per cent respectively if twenty-four hour deaths were included.

3. In the bacteremic cases the fatality rate was 28.1 per cent with drug alone and 30.0 per cent with drug and serum. If twenty-four hour deaths were included, the fatality rates became 32.8 per cent and 45.3 per cent respectively.

4. In contrasting the results of treatment in the cases treated early with those in cases treated late in the disease, the additional use of serum did not lower the fatality rate in either group.

5. The average response as judged by rapidity of fall in temperature in type I and type II cases was not enhanced by the use of serum.

6. No essential differences were noted in the therapeutic response obtained with the various drugs used—sulphapyridine, sulphathiazole, dextrose-sulphapyridine, sodium sulphapyridine, sulphamethylthiazole and sulphadiazine.

7. Of the 78 patients who died, 48 either entered the hospital in a near terminal condition and died within twenty-four hours or had some other severe systemic disease in addition to pneumonia.

8. The present rôle of serum in pneumonia appears to be its use in the treatment of patients who cannot tolerate the sulphonamide drugs or who do not respond satisfactorily within twenty-four to forty-eight hours to sulphonamide therapy.

Treatment of Hypothermia

(From the *British Medical Journal*, Vol. II, 16th August, 1941, p. 231)

ABOUT two years ago Prof. Temple Fay and Dr. Lawrence Smith of Philadelphia issued their first clinical report on the effects upon cancer growth of a general lowering of the body temperature by about 10°F. They termed this general depression of body temperature 'hibernation', while local cooling of a tumour was called 'refrigeration'. This earlier work has already been reviewed in our columns. A group of workers at the Lenox Hill Hospital, New York, reinvestigated the effects of this method of general cooling, but called it 'crymotherapy'. A third careful research has appeared under the authorship of Dr. J. H. Talbot of Boston, and he has introduced the term 'hypothermia', which on the whole seems more satisfactory and comprehensive than any of the other terms. He has reviewed the literature and points out that the local application of cold for treatment of cancer dates back as early as 1865. Recent studies have shown that regressive changes in tumours are most obvious when local hypothermia can be carried out at a temperature between 40° and 50°F. Special fitting coils through which a refrigerant circulates are applied and necrosis of tumour tissue may follow. Dr. A. McCravey has reported favourable results with local hypothermia in five cases of carcinoma of the bladder in which the bladder cavity had been marsupialized and exteriorized. In all cases the patient's life was prolonged beyond that expected for a patient not treated with hypothermia. It is possible that radiation combined with cold might be more effective than either alone, as the effects of cold upon the tumour cells are not so unlike those of radiation with *x*-rays. Talbot emphasizes that hypothermia is not looked on as a cure for cancer by even the most sanguine of its advocates, yet it does have a place in the treatment of a selected group of patients suffering from this disease. The Lenox Hill Hospital authorities publish a list of cases which are unsuitable for treatment by general hypothermia; it needs more careful consideration than does the local therapy.

Contrary to what has been taught hitherto, the lowest internal temperature that man can bear probably lies somewhere between 70° and 75° and not between 90° and 95°F. Two patients of Talbot and his colleague Tillotsen had rectal temperatures of 74° and 75°F. respectively, and both made an uneventful recovery from this cooling. The heat regulatory mechanism presumably ceases to operate below 75°F. in animals, and the continued fall in body temperature proceeds at the same rate as that in a dead animal in similar circumstances. If the animal is then warmed the thermal regulatory mechanism begins to assert itself at approximately 75°F. In the hibernating animal the body temperature may approach 32°F. without causing death.

For induction of general hypothermia Talbot recommends three or more grains of nembutal intramuscularly twenty minutes before the patient is placed nude in the cold environment at 32°F. Just before the cooling 0.5 to 0.7 gramme of evipan is given intravenously. Within an hour the anæsthetic effect of evipan has worn off and simultaneously the body temperature falls. The anæsthetic property of the cold usually obviates the necessity for further intravenous anæsthesia or sedative. By keeping the environmental temperature below 60°F. a working range for internal temperature (controlled by rectal thermocouple) between 80° and 90°F. is maintained for not more than twenty-four hours in the trial period of treatment. This trial period is especially necessary for patients older than 40 or who have metastatic cancer. Following the initial treatment there may be one or more additional periods of from two to four days each, while the intervals between successive treatments may be as short as two or three weeks. It is not known how many times the treatment may be repeated. A gradual restoration of body temperature at a rate not higher than 2°F. an hour is associated with fewer ominous signs than a rapid rise. No serious after-effects have been observed, but the development of pneumonia in patients with metastatic cancer in the lungs is sufficiently common to cause rejection of such patients for treatment. During hypothermia there are various changes such as initial rise of pulse and blood pressure followed by a gradual fall, obliteration of venous channels, constriction of large arteries but no vascular occlusion or thrombosis, prolongation of circulation time from arm to leg, disappearance of pupillary reflexes, cardiac arrhythmias such as sinus arrhythmia and auricular fibrillation. All Talbot's patients whose temperature reached 80°F. developed fibrillation, which was corrected by digitalis, quinidine, and restoration of body temperature. Unless fluid balance is maintained there is hæmoconcentration with an increase (25 per cent) in the red cell count. The white cell count increases several-fold with a rise in the percentage of polymorphonuclear cells. Routine urine analyses for albumin, sugar, and formed elements were negative.

The principal conditions treated up to the time of Talbot's publication were intractable pain, cancer,

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morphine addiction, leukæmia, and schizophrenia. Relief of pain may well be the most important gain, and all observers are in agreement concerning this; two-thirds of the patients treated had much relief. Some have found that sedatives, narcotics, and operative intervention (chordotomy and rhizotomy) for pain are no longer necessary. Morphine addiction *per se* has responded to general hypothermia, and the use of cold in diminishing the undesirable effects of alcoholic intoxication has been appreciated for at least 150 years. Talbot refers to a gentleman named Weeks who lived about that time back and was a great votary of Bacchus. For fifteen or twenty years he was in the habit of plunging into cold water when he rose from his bottle and of actually going to sleep in a trough full of water with his head specially supported. Instead of experiencing debility, lassitude, headache, and nausea, he found himself on awaking cheerful, refreshed, and free from all effects of intoxication.

The value of greatly reduced temperatures in other fields of surgery is also being studied by Dr. F. M. Allen of New York and others. Fundamental investigations are being very carefully conducted in order that undue enthusiasm over a spectacular novelty may not be followed by disillusionment, which may obscure any real value of the method. Dr. Allen introduces the use of the tourniquet with low temperature and gives some data of amputations through the thigh and the lower leg for diabetic gangrene and arteriosclerotic gangrene in aged patients; anæsthesia is produced by keeping the bloodless leg tissues for a period of from one to five hours at a temperature of about 5°C. by means of ice-bags or iced water. The leg is rendered bloodless before cooling by careful application of a narrow tourniquet after elevation of the leg to drain off any non-infected blood. The use of cold makes it possible to disregard the rule that a tourniquet must not be applied to a diabetic or arteriosclerotic limb. The tourniquet is released after the operation, when all is in readiness for closure of the wound. It appears that both primary and secondary shock are abolished by suitably low temperature in the damaged tissue, and the surgeon has the opportunity of working in a bloodless and shockless field; the low temperature inhibits growth of bacteria. Loss of vitality in wound flaps or mutilated tissue is also treated by local reduction of temperature, as is post-operative shock. Healing is slowed down but not stopped by low temperature. Attention is also being directed towards the possible use of hypothermia in military surgery and in embolism and other accidents. Embolism of a main artery is one of the conditions in which warming a limb is disastrous, and Dr. Allen believes that a suitable degree of refrigeration may be the most important non-operative treatment. At a temperature of 5°C. the requirements of the tissues for oxygen are reduced, and in intact animals the period of survival of the bloodless limb tissues has been experimentally increased at least to fifty-four hours as against the few hours or minutes at higher temperatures. Dr. Allen has attempted to apply this finding to surgery, but at present his researches are at a preliminary stage.

First-Aid Treatment of Burns

By A. H. McINDOE, M.B.N.Z., M.S., M.SC. (Minnesota), F.R.C.S., F.A.C.S.

(From the *Lancet*, Vol. II, 27th September, 1941, p. 377)

DURING the past year much thought has been given to the treatment of burns. This has culminated in recommendations made by the War Wounds Committee of the Medical Research Council after a prolonged survey of the results produced by various methods, under both civilian and Service conditions. It is not surprising that, considering the special causes and unusual types of burns encountered, these recommendations have modified established procedure, though not as extensively as many seem to believe. Careful perusal of the E.M.S. pamphlet (343)* will show that coagulation therapy, far from being condemned, remains an important method of treatment, particularly in the extensive burns of the 1st and 2nd degrees on the trunk and extremities common in civilian life, where shock and toxæmia are liable to follow. Exception was, however, taken to its use in encircling burns of the hands and feet and in other areas of functional importance, such as the face, flexures, perineum and genitalia, where experience showed that undesirable complications might follow. It was not suggested that burns of all degrees in these special areas showed equally bad results when coagulated, for many have not done so, but certainly some of the more severe burns in which function has been endangered have been further compromised by coagulants.

Most competent observers will agree that it is relatively easy to distinguish between a 1st and 3rd-degree burn, but often extremely difficult, even under the best conditions, to decide between those of the 2nd and 3rd degrees. If the surface is contaminated with dirt and oil it may be impossible to make an accurate diagnosis of any degree. This problem is much more acute at first-aid posts and advanced dressing stations, where cleansing facilities are often inadequate, light is poor, and examination is perforce superficial. When the patient is admitted to hospital the degree of involvement must be determined and the appropriate treatment decided on. It is thus vitally important that first-aid treatment should not compromise hospital treatment.

Experience shows that tannic acid is not a panacea for war burns, whatever its results in civil practice. It certainly takes its place, however, in the pattern of treatment which is being slowly evolved. This pattern has not yet reached finality. Alternative methods are still under investigation and it is not intended here to express dogmatic opinions as to their relative value. The wholesale distribution of tannic-acid preparations and vital dye coagulants to homes, first-aid posts and dispensaries has, however, created considerable confusion in the minds of many as to whether coagulants should be applied as a first-aid measure or whether other dressings should be substituted. The desire to make some sort of immediate local application to the burned area is strong, and admittedly the patient may be greatly relieved thereby. The ideal local application would be a quick-drying, flexible and elastic seal, incorporating bacteriostatic and anæsthetic agents. It should be painless to apply, and should resist, when dry, ordinary handling for two to three days without renewal and during that period prevent loss of tissue fluids and the entrance of organisms into the burned area. Especially, it should be water or oil soluble so that it can be easily removed at the hospital where adequate treatment of the burn is undertaken. Whether coagulation should be an essential part of its action is open to question.

None of the variety of suggested preparations exactly fulfils these requirements, and until the ideal substance is produced, obviously the simplest form of easily removable dressing is to be preferred. One can therefore agree with almost any coagulative or non-coagulative treatment which personal preference might dictate in the case of minor burns not requiring admission to hospital, but the first-aid application of any local treatment other than easily removable dressings to those major burns requiring hospital treatment should be discouraged. This is particularly true of those more positive coagulative agents applied hurriedly and inadequately over unclean surfaces in such a way as to be detrimental to the success of subsequent treatment in hospital. While there may be some disagreement between those who believe in universal coagulation and those who do not, they are united in the opinion that first-aid tanning of serious burns is a handicap to the definitive hospital treatment, because once they are applied the crust is difficult to remove.

The function of the first-aider is therefore, firstly, to distinguish between minor burns which do not require

*See *Lancet*, 1941, 1, 425.

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hospital treatment and to treat them efficiently; secondly to transfer major burns to the nearest hospital or burn unit as soon as possible, limiting treatment to measures of a general nature and to simple local applications, avoiding anything which may be difficult to remove.

The problem is not altogether simple, for while the majority of badly burned patients can be transported to hospital within a short time, it may be days before others can reach suitable hospital facilities. Thus first aid may be required for burns at sea or in the desert under such difficult conditions that treatment considered inadvisable where quick transport is available might be desirable where there is great delay. An attempt is being made to suggest a reasonable first-aid programme adequate for burns of various types occurring under varying circumstances.

MINOR BURNS

A minor burn is defined as one of the 1st or 2nd degree, covering an area not greater than 1 per cent of the total body surface—*i.e.*, an area corresponding in the adult to one side of the hand or about 28 square inches. It should not involve any of the special areas already mentioned: the hands, face, feet, flexures, perineum and genitalia. Shock is not in evidence and sepsis is uncommon. Pain is usually severe. Healing is rapid by regeneration from the undamaged portion of the skin, whatever local application is used.

General treatment.—If pain is not controlled by aspirin or veganin, then morphine gr. 1/6—1/3 should be given (for an adult).

Local treatment where cleansing facilities are available.—Since these burns are not sent on to hospital, first-aid treatment is as a rule definitive. Whatever is applied should be regarded as the final dressing. Some form of coagulant is therefore safe, simple and satisfactory. Coagulation seals the surface, abolishes pain, prevents secondary infection, and enables the patient to carry on with his work within a short time.

If the burned area is likely to be contaminated, it should be carefully and gently washed, together with the surrounding skin, with soap and water. An application is then made of one of the coagulants in tube form, usually available at most first-aid posts, such as Tannafax, Amertan, gentian-violet jelly, or triple-dye jelly. It is either smeared directly on the burn or applied on a single layer of lint or gauze. Alternatively, the surface may be .daubed with 10 per cent tannic acid, 5 per cent silver nitrate, or both, or painted with gentian violet 2 per cent or triple dye (gentian violet 1/400, brilliant green 1/400, neutral acriflavine 1/1000). If tannic acid or silver nitrate is used no dressing should be applied over the burned area.

Non-coagulant dressings may also be used, such as Vaseline gauze, tulle gras, ambrine, or soft paraffin, but care must be taken to ensure the sterility of the dressings. If sulphanilamide powder is liberally sprinkled over the burn before their application the risk of sepsis will be negligible, and possibly the rate of epithelialization greater than with coagulant dressings. It is certainly true of the sulphanilamide, tulle gras, saline sequence now in wide use. Nevertheless, the coagulants have a decided advantage over non-coagulant dressings as a first-aid dressing for minor burns, in that once applied they do not require renewal or much aftercare and are not so liable to contamination from outside sources.

The newer preparations, such as euglamide, a paste incorporating albucid and a local anæsthetic, and the water-soluble jellies containing sulphanilamide alone or in combination with an antiseptic, have given good results but are not altogether suitable for first-aid purposes, because of their messiness and inability to remain *in situ* for long.

Local treatment where cleansing facilities are not available.—Not infrequently, burns of this type are badly contaminated with oil or dirt, under such difficult conditions that adequate cleansing facilities are not at hand—for instance, at a thoroughly disorganized first-aid post, where the water has failed, in the desert, or at sea in an open boat. If any form of cleansing is impossible, it is foolish to coagulate a heavily contaminated burn of any type, and thereby seal up organisms on the damaged surface. In any case, the presence of oil will prevent coagulation. It might be pointed out that in the desert where mechanical transport is usually near, benzene or petrol are excellent cleansing agents and are also practically painless when applied to injured surfaces. Under such circumstances, one of the non-coagulant dressings should be used, and if flies constitute a menace the whole area can be sealed off with a piece of oiled silk, or, if it is available, enclosed in a Bunyan-Stannard envelope. At sea, failing all else, a compress of sea water would be excellent provided it was kept wet.

CLASSIFICATION OF MAJOR BURNS

Burns of any greater extent or depth than minor burns or any burns of the hands, face, flexures, genitalia or perineum should be regarded as of major importance and dispatched to the nearest hospital or burn unit as soon as possible. As opposed to minor burns, the first-aid problem centres round the patient's general condition and the question of how soon he can be transferred. Local treatment is of secondary consideration except under unusual circumstances, and should be concerned only with the protection of the burns from further trauma and secondary infection. Major burns may be classified as follows:—

(*a*) Major burns without serious shock where transport is available. These form the majority of war burns and are easily dealt with.

(*b*) Major burns with serious shock rendering transport dangerous. There are very few cases of this type. They become noticeably fewer the greater the experience of the observer and the more prompt the transport arrangements.

(*c*) Major burns with or without shock, occurring in situations where transport is delayed or is not available. With severe shock every moment which passes before the administration of plasma or serum increases the risk to life. Hence it is better to undertake a difficult journey than to allow blood-volume to fall and hæmoconcentration to rise. Naturally these are difficult problems and much depends on local facilities, mode of transport and distance to the nearest hospital.

SHOCK

Although shock has been divided into primary and secondary forms the former is not commonly seen; if it does occur it resembles a fainting attack due to neurogenic and traumatic factors. It usually passes off quickly under the influence of rest, heat and morphine.

True burn shock (called secondary shock) has all the characteristic signs of ordinary wound shock—rising pulse-rate and respiration-rate, pallor, thirst, anxious restlessness, falling blood-pressure, and so on. It must always be regarded as serious, for it is responsible for 60 per cent of all deaths from burns. It may appear within an hour of injury but does not usually show itself for six hours or more. During this time the patient feels and looks well and may even have walked several miles to a dressing station with burns of the most extensive type. This is common in Service casualties. The detection of incipient shock in such cases is difficult without hæmoglobin estimations but the possibility of its clinical development, either slowly or suddenly, must always be borne in mind. Shock results from failure of the circulation in the face of hæmoconcentration and falling blood-volume. The 'trigger' which usually induces it is rapid loss of body heat from exposure to cold or further trauma to the already injured skin surface. Undressing the patient to examine the burns in first-aid posts, or any rough handling of burnt areas, should therefore be sedulously avoided. As a rule there is a relatively safe period in the first six hours in which the patient, though severely burned, can stand a reasonably long journey (20 to 30 miles) by road ambulance. There are few cases to which this does not apply. The patient may suddenly become shocked during transfer, but this is not necessarily the result of the journey.

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It would probably have happened anyhow. The likelihood of shock supervening rapidly may be judged from the extent and situation of the burns, but as it is dangerous to undress a burned patient, only a very rough estimate of this can be made. In general, shock is liable to be serious if more than 25 per cent of the body surface is involved. In estimating this percentage the following table may be useful:—

	Per cent		Per cent
Head ..	.. 6	Entire front of trunk	19
Both hands	.. 6	Entire back of trunk	19
Both arms	.. 18	Thighs ..	19
Lower legs	.. 18	Feet	6

Burns of the face, precordial area and abdomen are more dangerous than those of the arms, legs or back. The depth of the burn is not so important as its extent.

If for any reason there is delay at the first-aid post and shock is feared, the pulse and respiration should be noted every half hour, and the B.P. taken as often as possible. With burns of the hands and arms this may be impossible.

General treatment of major burns

Pain.—All patients with major burns should receive a full dose of morphine immediately ($\frac{1}{3}$—$\frac{1}{2}$ gr. for an adult). Anything less is futile and the dose can be repeated. Many patients with severe burns are not conscious of pain until the shock phase is over but moderate burns without shock are usually extremely painful.

Shock.—If this is likely to occur while waiting for transport to arrive the patient should lie down on a stretcher or cot and be covered with blankets, with hot-water bottles to keep him warm. Unless the clothing is soaked in water or other fluids it should not be removed, and then only if something warmer can be substituted. Hot sweetened drinks such as tea or coffee should be given freely. Plasma or serum injection is rarely possible or advisable in first-aid posts, and if required should be obtained by means of a mobile unit from the nearest hospital. Rapid transfer of the patient to the hospital is certainly the better plan. In the Services, all station sick quarters, many advanced dressing stations and some ships are suitably equipped for intravenous therapy in the places where delay in transport is likely. Plasma should be used wherever it is indicated. The usual preliminary dose is two bottles of dried plasma or liquid human serum given according to M.R.C. Memorandum No. 1. This may in serious cases be increased to ten or twelve bottles.

Local treatment of major burns

Major burns should not be coagulated as a first-aid measure. The local conditions are almost always totally unsuitable for this procedure and in the majority of cases more harm than good will be done. Burns on exposed parts dispatched forthwith to hospital should be powdered with sulphanilamide and covered with a sterile towel or wet compress of sodium bicarbonate or saline. Since contact with air is painful the burn surface may be more efficiently protected with simple vaseline gauze strips or tulle gras over the layer of powder. The Bunyan-Stannard oilsilk envelope is a useful added protection during transport, and indeed may be used alone for this purpose.

The problem of the burned patient when transferred to hospital will be delayed for days—*e.g.*, at sea, in the desert or in isolated spots—is difficult, and will depend on the facilities at hand and the severity of the burn. For the patient's comfort it may be necessary to coagulate the whole area, in which case the vital dyes or silver nitrate 10 per cent, which are themselves antiseptic, are most suitable. It will be best to avoid an anæsthetic if possible, for this will undoubtedly increase the risk of shock. Flies will usually constitute a major danger, hence the oilsilk envelope will have considerable value. First-aid treatment in these circumstances will constitute an unhappy compromise between what is possible and what should be done.

Reviews

MEDICAL DISEASES OF WAR.—By Sir Arthur Hurst, M.A., D.M. (Oxon.), F.R.C.P. Second Edition. 1941. Edward Arnold and Company, London. Pp. viii plus 427. Illustrated. Price, 18s.

THE second edition of this excellent book is very welcome, especially when the major portions of the British and Allied Nations' armies are in training, and are waiting, rather than in action, and are therefore far more likely to need the attention of the physician than the surgeon.

The title has been liberally interpreted, and the book includes a wide range of medical diseases; pediatrics and gynæcology naturally find no place in this book, but, in view of the number of women now in the active services, one wonders whether a chapter on the latter subject will not find a place in some subsequent edition.

Trench fever is given disproportionate attention. We have not heard that it has appeared again in this war, but one presumes that the material on which the account is based was handy—and it is certainly a very good account of the disease—so it was presented. One would have appreciated some data on heat stroke which, one feels, the campaign in Libya must have provided.

The accounts given of tropical diseases, such as malaria and the dysenteries, and their treatment, are thoroughly sound and remarkably comprehensive for the space in which each is contained.

There is a good chapter on epidemic jaundice, in which leptospirosis is given pride of place, but other epidemic jaundices which are sometimes forgotten are given suitable prominence. One wonders why the author adheres to the obsolete *Leptospira ictero-hæmorrhagica*.

It is a book that we can very strongly recommend to the new, or to the experienced, service doctor. We must also comment on the very high standard of book production that is still being maintained in England in the face of great difficulties.

AIDS TO PATHOLOGY.—By Kenneth Campbell, O.B.E., M.B., F.R.C.S. Eighth Edition. 1941. Baillière, Tindall and Cox, London. Pp. viii plus 261, with 12 Illustrations. Price, 5s.

THIS is the eighth edition of the book since its first appearance in 1907. The author should be congratulated in his attempt to incorporate most of the subject in a small volume of two hundred and sixty-one pages. There are of course limitations in a publication like this which aims at presenting the subject in a short and concise form. The author has very wisely drawn attention to this fact in the preface.

In the chapter on 'Nature's defences' the author has dealt with agglutinins and precipitins, etc., in a few lines. It is worth considering whether this sort of inadequate discussion on immunological reactions will not create confusion in the minds of students and would not be better left out altogether. In discussing the mechanism of infarction the writer says 'much controversy has taken place on this still debatable question, which after all is of trifling importance except to pedants'. The author will find support from many pathologists to his contention.

Aids to Pathology will be of much use to students while revising the subject. Considering the vastness of the subject which has been compressed into the small size of the book, this volume is bound to be very popular with the student who wants to acquire a cut-and-dried knowledge of the subject.

B. P. T.

OPHTHALMIC NURSING.—By Maurice H. Whiting, O.B.E., M.A., M.B., B.Ch. (Cantab.), F.R.C.S. Third Edition. 1941. J. and A. Churchill Limited, London. Pp. xiv plus 157, with 54 Illustrations. Price, 6s.

THIS is the third edition of this book and it has been brought up to date by the introduction of sulphonamide

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and the other kindred drugs in the treatment of bacterial infections and their application in the treatment of diseases of the eye. A short section has also been added dealing with gas burns of the conjunctiva and the eyeball.

The book consists of 157 pages divided into 14 chapters and is based upon the practices adopted at Moorfield's Eye Hospital, London. The book is excellent, written in simple style and well provided with illustrations. In India, where so much eye disease prevails and where so many thousands of operations on the eye are performed, the book will not only be found most helpful and useful but indispensable. Good ophthalmic nurses are few and far between and many nurses complete their training without much experience in the nursing of eye cases. The teaching advocated by the author is on the whole suitable for India except that bandaging of the eyes has been given up and replaced by fine strips of sticking plaster applied over the dressing. In cataract operations both eyes need only be covered for one day and not as advocated by the author for three or four days. Morphia after intraocular operations is better avoided owing to the danger of it causing vomiting. The best eye shield is the Kirkpatrick celluloid one and far more satisfactory than the Fuch's or cartella shields advocated by the author. The Guist operation of chemical cauterization is now obsolete.

We strongly recommend the book not only to nurses, but also to house surgeons and medical men interested in ophthalmology in India.

E. O'G. K.

THE MEDICO-LEGAL POST-MORTEM IN INDIA.—By D. P. Lambert, M.D., Ch.B., D.T.M. & H. (Univ. Edin.). Second Edition. 1941. J. and A. Churchill Limited, London. Pp. vii plus 113. Price, 5s.

MAJOR D. P. LAMBERT'S *'The Medico-Legal Post-mortem in India'* is a nice little compilation which will be of immense practical importance to the students and a very useful guide to the doctor in the post-mortem room.

The little book contains seventeen chapters and though each chapter has to its credit some very excellent and reliable information unfortunately the seven concluding chapters are unusually short. He has given a very typical and vivid description of the bodies generally found in various stages of decomposition in the post-mortem rooms in India.

In my experience in Bengal the way in which bodies are usually sent for post-mortem examination is not very satisfactory, as they are tightly bound down from head to foot after being wrapped in a *chatai* (mat) and thickly covered with charcoal powder to prevent decomposition. This procedure adds insuperable difficulties in the identification of the various kinds of wounds in them and in assessing their values in a court of law. I think mention should have been made of this point.

Of the earlier chapters that on gun-shot wounds is considered to be an excellent one as it contains clear and practical elucidation of them which are not met with in many textbooks.

Of the concluding chapters, those on electrical injuries and abortion could be profitably enlarged to some extent in spite of the fact that Major Lambert has resisted all temptations to do so.

As an examiner I can only say with emphasis that this book should be the constant companion of all students who enter the post-mortem room to get a preliminary knowledge on this subject.

The get-up of the book is nice and handy and the subject-matter has been expressed in very lucid language without any ambiguity.

L. G. B.

ACCIDENTAL INJURIES: THE MEDICO-LEGAL ASPECTS OF WORKMEN'S COMPENSATION AND PUBLIC LIABILITY.—By Henry H. Kessler, M.D., Ph.D., F.A.C.S. Second Edition. 1941. Henry Kimpton, London. Pp. 803. Illustrated with 202 engravings. Price, 45s.

THE title of this book is rather misleading, as it does not deal with the treatment of such injuries. A subtitle given on the title page 'The Medico-legal Aspects of Workmen's Compensation and Public Liability' is much more expressive of the scope of the work.

It has been primarily written for the guidance of medical referees in the assessment of workmen's compensation, a purpose which it fulfils admirably. The information given regarding the general prognosis, period of incapacity, sequelæ and permanent disability of injuries is authoritative and well-described, and useful statistics are given. This information is probably not available in any other single volume, and for this reason is likely to have value beyond the original intentions of the author in being of assistance to those who will have to assess the disabilities, both military and civil, due to enemy action in the present conflict.

It is scarcely necessary to point out that the legal rulings and percentage of disabilities quoted are based on American court rulings, and must be modified in accordance with the law and practice of this country.

J. C. D.

Abstracts from Reports

TRIENNIAL REPORT ON THE WORKING OF THE CIVIL HOSPITALS AND DISPENSARIES IN THE PROVINCE OF ASSAM FOR THE YEARS 1938, 1939 AND 1940. BY LIEUT.-COLONEL A. M. V. HESTERLOW, M.B., Ch.B. (EDIN.), B.Sc., P.H. (EDIN.), D.T.M. & H. (EDIN.), I.M.S., INSPECTOR-GENERAL OF CIVIL HOSPITALS, ASSAM

RESOLUTION

DURING the triennium the number of hospitals and dispensaries of all classes rose from 281 to 305.

The total number of indoor and outdoor patients treated at medical institutions decreased from 6,567,717 in the previous triennium to 5,990,774. The decrease was confined to the districts of Sylhet, Kamrup, Goalpara, Nowgong and Sibsagar. In other districts there was increased attendance. The variations are ascribed to differences in general healthiness and incidence of malaria in the districts concerned.

The total number of beds provided in all classes of hospitals rose from 1,797 in 1937 to 1,943 in 1940.

In spite of financial stringency, there was some improvement in accommodation. The Mokokchung Civil Hospital secured accommodation for 22 more beds and the Sylhet Civil Hospital for 16 more beds. An additional block of 26 beds for male patients was provided at the Tezpur Mental Hospital, at a cost of Rs. 15,500.

The department's effort to raise the standard of local institutions was greatly assisted by gifts made by public-spirited people. At Tinsukia the construction of a modern hospital, at an estimated cost of Rs. 44,000 given in full by the late Babu Surajmall Jalan of Tinsukia, was started and is nearing completion. At Dibrugarh Civil Hospital, two special female wards of 4 beds each are being built. For these a gift of Rs. 6,000 was made by Babu Mohanlal Ajitsaria, on condition that the wards should be called the 'Rautmall Wards' after his late father. At Maulvibazar a new dispensary building, a maternity ward, a female ward, nurses' quarters, a leprosy clinic, and other accessories were provided by public donation, including a gift of Rs. 2,500 made by Babu Gagan Chandra Sen for the female ward. In Kohima, the Naga Club contributed

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Rs. 1,150 towards the construction of an operation room.

Kala-azar.—The total number of cases treated in 1940 in dispensaries other than those directly under the Public Health Department was 10,735 against 8,702 in 1939 and 8,775 in 1938. Increased efforts are being made to combat this disease.

Leprosy.—The leper hospitals and asylums continued as before. An inquiry was made by an officer of the British Empire Leprosy Relief Association in 1940, and Government are considering the need for certain changes as a result of his report. Twenty-seven Public Health Officers were trained in leprosy treatment, and propaganda was carried on with magic-lantern demonstrations and lectures.

Malaria.—The total number of cases treated during the triennium was 2,143,008 against 2,146,726 in the previous triennium. Ten malaria surveys were done by the Malaria Research Society—four in tea gardens, four in Government areas, and two on behalf of other constituents of the society. Twenty-seven doctors attended the annual eight-week course in malariology. Technical guidance was given by the society for anti-malarial operations in eighteen centres under Government and for other such operations in tea gardens where survey was carried on. In all these areas the good effects were noticeable.

During these three years there was some lack of quinine, which is attributed partly to the exhaustion of the free gift of quinine made by the Government of India and partly to the lack of adequate provision by local bodies. Government express the hope that local bodies will not reduce their own provision in the expectation that deficiencies will be supplied by free gifts from other sources. At the same time they are trying to improve the supply of quinine and cinchona febrifuge, though the war has brought increased difficulties.

Smallpox.—The number of cases treated in 1940 was 116 against 35 in 1939 and 97 in 1938.

Cholera.—The number of cases treated fell from 3,027 in 1938 to 458 in 1939, and then rose in 1940 to 963.

Tuberculosis.—Anti-tuberculosis propaganda was carried on as in the previous triennium. The Tuberculosis Association of Assam was formed in 1939 and took over the work of the authorities in charge of the King George Thanksgiving and King Emperor's Anti-Tuberculosis Funds. The new association has begun to plan for organized work in the province, taking over the Shillong Chest Clinic. There were several improvements in accommodation, staff and the training of doctors, and there is now a project for a tuberculosis clinic and hospital at Shillong.

Goitre.—The disease was prevalent throughout the province, especially in Goalpara, the Naga Hills, and Lakhimpur. Extensive experiments with iodized salt were carried out in the Naga Hills, and the results are reported to have been good.

Subsidized dispensaries.—In an effort to make medical relief more extensive, Government sanctioned 27 such dispensaries, of which 15 were working at the end of 1940. The system is still in an experimental stage, and Government are considering the various problems involved, with a view to improvement.

Nurses.—The need for trained midwives, nurses and health visitors is engaging Government's attention. The Sisters of Charity continued their excellent work at the civil hospitals of Sylhet, Gauhati and Dibrugarh.

REPORTS ON THE WORKING OF MUNICIPALITIES IN BENGAL DURING THE YEAR 1939-40

THE municipal authorities generally showed considerable interest and energy in matters relating to public health and sanitation in their respective areas. There was, however, a slight decrease in the expenditure on account of the municipal health officers and sanitary inspectors which fell from Rs. 2.43 lacs to Rs. 2.41 lacs, while the total outlay on hospitals and dispensaries and on other sanitary measures also fell from Rs. 4.76 lacs to Rs. 4.66 lacs and from Rs. 1.49 lacs to Rs. 1.34 lacs, respectively.

Cholera and smallpox broke out in epidemic form in a few municipalities but were mostly brought under control by the timely adoption of preventive measures. The Public Health Department also sent their experts to help in dealing with the situation in Naihati and Bhatpara municipalities arising out of an epidemic of smallpox. Sporadic cases of cholera and smallpox occurred, as usual, in several towns but were generally promptly dealt with by the municipal authorities.

A permanent staff of vaccinators was maintained by most of the municipalities and free vaccination was given as usual, at fixed stations and, in some municipalities, also at the houses of the rate-payers.

Anti-malarial measures on approved lines were adopted by a number of municipalities. The Bally municipality carried out anti-malarial work in co-operation with the East Indian Railway administration at Lillooah with the result that there was practically no malaria during the year and the general public health was good. An experimental five-year anti-malarial scheme, financed from grants from Government and the Rockefeller Foundation in equal shares and covering the town of Jessore and its environment, was undertaken by the Public Health Department and fair progress has been made in checking the disease. Anti-malarial measures were conducted by the staff of the Dacca anti-malarial committee, an independent organization supported by contributions from Government, the District Board, the University, the Dacca Club and from other sources. The work of the committee was of great benefit to the Dacca municipality. As in previous years, most of the municipalities took steps to improve the general sanitation of the towns by cutting down roadside jungles, disinfecting tanks and ditches, and by issuing notices to private persons for clearing their lands of weeds, jungles and other insanitary vegetation.

Anti-rabic treatment was undertaken, as usual, by several municipalities. Special arrangements for the treatment of kala-azar and leprosy were made by the municipalities of Krishnagar and Nawadwip. Krishnagar maintained a tuberculosis clinic and Nawadwip carried on anti-tuberculosis propaganda in every school in order to guard against the disease. The leprosy clinic at Berhampore also worked satisfactorily. At Kurseong, 60 new cases of tuberculosis were detected by the health visitor during the year under review and the persons affected were either removed to hospital or given necessary instructions.

Municipal authorities were also not unmindful of their duties in regard to maternity and child welfare. Several municipalities organized *dai*-training classes—the *dais* being supplied with necessary equipment after the completion of the usual course of lectures and practical training. A maternity centre was established at Hooghly-Chinsurah and the Narayanganj Mahila Samiti organized an exhibition with the co-operation of the district board.

An *x*-ray ward at an estimated cost of over Rs. 15,000 was under construction in the Sardar Hospital at Comilla and for this purpose a donation of Rs. 12,500 was received from Mr. A. C. Sen of Chunta.

The administration of the Food Adulteration Act continued to be uneven and inadequate as in the preceding years in almost all municipalities, except a few in which the municipal authorities showed commendable vigilance and energy in detecting and prosecuting the dealers in adulterated foodstuffs.

ANNUAL REPORT OF THE MALARIA ADVISORY BOARD, FEDERATED MALAY STATES, FOR THE YEAR 1940. By A. NEAVE KINGSBURY, CHAIRMAN

WE received this report just after Kuala Lumpur had fallen into enemy hands so it was with a feeling of sadness that we read this record of hard work for the year and plans for the future.

The fine results in malaria control achieved throughout the Federated Malay States, many of which are recorded annually in the report of the advisory board, must necessarily receive a complete setback and when peace once more becomes established, work will have

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to be commenced once more from the beginning. Let us hope that this will be soon and that the members of this board are all safe so that as soon as the opportunity occurs they can resume their rudely interrupted task.

ANNUAL REPORT OF THE DIRECTOR OF THE PASTEUR INSTITUTE OF SOUTHERN INDIA, COONOOR, TOGETHER WITH THE THIRTY-FOURTH ANNUAL REPORT OF THE CENTRAL COMMITTEE OF THE PASTEUR INSTITUTE ASSOCIATION FOR THE YEAR 1940–41

ANTI-RABIC TREATMENT

DURING the thirteen months under review, 16,710 courses of anti-rabic vaccine were prepared and issued under the revised system of treatment. Of these, 1,181 courses were issued during December 1939, and the remaining 15,529 courses during the calendar year 1940.

During the period under review, 355 patients received a complete course of anti-rabic treatment at the Institute (346 Asiatics and 9 Europeans). Incomplete courses of treatment were also given to 36 patients, of whom 12 were absolved from further treatment after the possibility of rabies in the biting animal had been excluded. The remainder absconded.

The treatment given at the various subsidiary centres was similar to that administered at the Pasteur Institute, Coonoor.

The various centres returned 14,973 case cards for patients treated during the period under review. Of these, 11,415 received a complete course of treatment and 3,450 were incompletely treated. The remaining 108 were absolved from further treatment as the possibility of rabies in the biting animals was excluded.

Only 31 deaths were recorded among the 14,865 patients who received complete or incomplete courses of treatment, giving a mortality rate of 0.20 per cent.

Anti-rabic vaccine was also made available for the prophylactic treatment of animals. While it is advocated that dogs should be protected before they are exposed to infection, it is found in practice that treatment is comparatively seldom given until the animal is at risk. During the year, 30,940 c.c. of 5 per cent carbolized sheep-brain vaccine were issued for the treatment of animals, chiefly to the veterinary officers in the Madras Presidency and neighbouring Indian States. The number of animals treated during the year was 494 of which 438 were dogs.

Routine laboratory examinations were carried out on a large scale for the benefit of hospitals, dispensaries and practitioners. The total number of examinations carried out during the year was 2,300. Most of this was done free of charge, but fees were recovered at schedule rates from patients who were in a position to pay, except in the case of Government servants.

NUTRITION RESEARCH LABORATORIES

(Indian Research Fund Association)

Director, Dr. W. R. Aykroyd, M.D., SC.D.

In the 1939–40 Report of the Director of the Pasteur Institute of Southern India a general account was given on the development and activities of the Nutrition Research Laboratories, which enjoy the hospitality of the Institute. The note in this year's report deals only with developments during the current year.

The analysis of foods.—One of the most important activities of the laboratories is the study of the nutritive value of Indian foods. Most common Indian foods have been analysed within recent years for their content of protein, fat, carbohydrate, calcium, phosphorus and iron. The most recent addition of Health Bulletin No. 23, 'The Nutritive Value of Indian Foods and the Planning of Satisfactory Diets', contains nearly 300 analyses of different foodstuffs. Though much work has been carried out in this field, considerable gaps in our knowledge remain, particularly with regard to the distribution in foods of certain vitamins. The laboratories have for some time past paid particular attention to the B group of vitamins, which are of great importance in human nutrition, and particularly so in India where the usual type of diet consumed by the poorer classes tends to be deficient in one or more of these essential food factors.

Chemical tests for nicotinic acid, vitamin B_6 and flavine, which are all important members of the B_2 group of vitamins, have been devised. These have been applied in the analysis of foodstuffs and in other directions. In general the B_2 group is found in most abundant quantity in milk, meat, eggs and fish, and is present in smaller quantities in vegetable foods such as cereals, pulses, vegetables and fruits.

As a result of the war, imports of cod-liver oil into India have practically ceased. Cod-liver oil is of value because it is a rich source of vitamins A and D. Vitamin-A deficiency is extremely common in most parts of India; keratomalacia, a destructive eye disease caused by lack of vitamin A, is one of the commonest causes of blindness in South India. Failure of cod-liver oil supplies would be a serious matter for India if a substitute were not available. Fortunately substitutes are available in the form of liver oils obtained from fish caught in Indian waters. The liver oil of the shark and saw-fish is considerably richer in vitamin A than that of the cod. The laboratories have carried out numerous tests of the vitamin content of Indian fish-liver oils, and have thereby helped in the creation of a local industry for the production of cod-liver oil substitutes. At the present time substitutes, mainly based on shark-liver oil, are being used all over the country.

Animal experiments.—A large stock of rats is maintained for use in nutritional experiments. The stock usually amounts to some 700 animals. These are fed on a diet devised some years ago by Sir Robert McCarrison which consists of whole wheat chapatties, butter, leafy vegetables, carrots, a little meat and whole milk *ad lib.* On this diet the animals thrive and disease has been eliminated from the colony. An abundant supply of young rats for experimental purposes is always available. During the year a number of growth experiments on rats has been carried out to test the nutritive value of various Indian diets and the metabolism and excretion of various vitamins have been studied in rats fed on various experimental diets. The rats were also employed in staging demonstration experiments for the nutrition class.

The laboratories include a pathological department, and within recent years numerous studies of pathological changes occurring as the result of food-deficiency diseases have been made. Monkeys fed for considerable periods on poor rice diets showed a high mortality from chronic diarrhœa and in such monkeys atrophic changes in the lower third of the small intestine, sometimes accompanied by mild inflammatory lesions in the large intestine, have been observed consistently. Recently a worker in East Africa has described a condition in human beings resulting from dietary deficiency which appears to be identical, as regards pathological changes, with that observed in the monkeys here. It is hoped to extend this investigation by the pathological study of human material in India. At the present stage the results of the investigation suggest that the nutritional element is of importance in connection with the high mortality from dysentery and diarrhœa in India.

DEFICIENCY DISEASES

Night-blindness, or inability to see in a dim light, may be one of the results of vitamin-A deficiency. The dark adaptation curves of cases of clinical night-blindness were determined by an apparatus of the Birch-Hirschfeld type constructed in the laboratories. As compared with normal controls these showed a greatly decreased rate of adaptation and a raised final visual threshold. The administration of 216,000 international units of vitamin A in a single dose (Prepalin) brought about a change in the dark adaptation curve within 6 hours. Within 48 hours the curves had returned to normal and the patients themselves recorded the improvement in their vision in restricted light. Two of these cases had previously been treated with relatively small amounts of vitamin A through the medium of cod-liver oil without striking or rapid improvement so that a high

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dosage of vitamin A appears to be necessary if immediate effect is to be obtained.

Infantile beri-beri.—In all Eastern countries, apart from India, in which beri-beri is prevalent, the disease is known to be common among infants. It usually attacks breast-fed infants at about the third month of life, and is often fatal. Infantile beri-beri has not, however, been reported in India. During visits to the Northern Circars the opportunity arose of observing clinically, infantile cases which were unquestionably of this nature and this gave rise to the suspicion that infantile beri-beri, though generally unrecognized, may be a serious problem in this area. The study of infantile mortality in various towns in the beri-beri area showed that there was a striking peak in mortality at about the third month of life. This is a public health finding of considerable interest and importance. There is little doubt that the heavy mortality at this period of life is due to vitamin-B_1 deficiency, and suitable preventive measures might do much to reduce infantile mortality in the beri-beri area.

Superficial keratitis due to flavine deficiency has been studied in the Government Ophthalmic Hospital, Madras. This very common condition responds very rapidly to injections of pure flavine.

Studies on *anæmia* have been carried out in Coorg, and in the same area an investigation of tropical ulcer, in the causation of which malnutrition probably plays a part, has been undertaken.

Training course.—The usual training course in nutrition was given during the months of April, May and June. The class included 26 members from all over India and a few visitors staying in Coonoor for the season attended some of the lectures. This is the fifth annual class and the course now follows well-established lines.

Vitamin-C preparations.—An important activity during the year has been the manufacture of vitamin-C preparations from the *Amla* or Indian gooseberry (*Phyllanthus emblica* Linn), for military use. Amla is the richest known source of vitamin C and the dried and powdered pulp of the fruit remains a very rich source of the vitamin for many months.

Bulletins.—A new edition of *Health Bulletin No.* 23, 'The Nutritive Value of Indian Foods and the Planning of Satisfactory Diets', has been prepared during the year. This is the third edition of this popular bulletin. A bulletin, 'Food Diet', written for children, is now under preparation. It is hoped that this will be widely used in schools throughout India. *Health Bulletin No.* 28, 'Rice', is a popular summary of a scientific monograph entitled 'The Rice Problem in India'.

TWENTY-SIXTH ANNUAL REPORT OF ST. DUNSTAN'S, LONDON, FOR THE YEAR ENDED 31ST MARCH, 1941. ISSUED BY THE EXECUTIVE COUNCIL OF ST. DUNSTAN'S, LONDON

THE report mentions that many of the instructors at St. Dunstan's were themselves, as was Sir Ian himself, blinded in the Great War. They are splendid instructors and set a most valuable example to their young blinded pupils.

'Talking about these young people', Sir Ian continues, 'we older men agreed as to their serious, thoughtful outlook and we also felt quite sure they were much better educated than we were. We thought we did pretty well when we came back from France, or Flanders, or Gallipoli, and found our way around in our new world of darkness, but we have been surprised at the speed with which the new St. Dunstaners are learning to be blind. Within a few days they are walking about the wards and classrooms; and within a few weeks the grounds and the way to the village (Church Stretton) are familiar. They do not shuffle along with a tapping stick like the proverbial blind man of ancient times, but walk erect and fearlessly, and try to look and behave as normally as possible.'

In learning braille reading and typewriting, many have passed already the severe and accurate tests which are their first qualifications as trained blind men. They learn to play, also, many indoor and outdoor games and recreations—cards, dominoes, a debating society, concerts, goal-kicking, tug-of-war, rowing, walks, treasure hunts, tandem cycling, amateur dramatics, music and dancing are great fun and an important part of re-education. 'The great thing', he says, 'is to learn to do everything you possibly can without your sight and enjoy it.'

There is a massage class, a telephone switchboard operating class, a variety of handicrafts. The last mentioned may lead to greater things, for it is hoped some of the craftsmen will become sufficiently expert to be placed later in munition and engineering works. 'Already a number of blinded soldiers in the Great War, now in their forties, anxious to lend a hand in the war effort, are undertaking gauging, sorting, packing, machine-minding, and other jobs in factories.'

Some will become shopkeepers. One blinded young man has already returned to business as a branch manager. Another has started his training as a solicitor. A girl motor driver of the A.T.S. (F.A.N.Y.) who was a professional singer is studying to continue her work in spite of total blindness. How many men have never got out of the rut because they have never had the education and the chance? St. Dunstan's young men who are blinded have a great handicap but they will have the best education and the best chance that organization, with its twenty-five years' experience, can give them.

The report mentions the establishment of the nucleus of a St. Dunstan's Training Centre in South Africa for blinded men of the Home and Overseas Forces evacuated from the Middle East and that, with the help of the War Office and the Invalids Comforts Section of the Prisoners of War Department of the British Red Cross Society, comforts and means for preliminary re-education supplied and arranged by St. Dunstan's, for blinded men in enemy countries, were reaching their intended destinations.

More women than last time will inevitably be included in their members because women are taking a more hazardous part in the Defence Services. Among those now admitted to St. Dunstan's are members of Home and Air Raid Defence organizations, if blinded whilst on duty, for St. Dunstan's now gives its full benefits to all who are blinded in the war service of the Empire.

Service Notes

APPOINTMENTS AND TRANSFERS

The following appointments are made:—

INDIAN LAND FORCES

(Emergency Commissions)

To be Captains (on probation)

5th August, 1941

Jamshed Nasarvanji Choksy, with seniority from 15th August, 1937.

6th August, 1941

Sris Chandra Ray, with seniority from 22nd November, 1934.

24th August, 1941

Rahmat Ullah Quareshi, with seniority from 1st March, 1939.

5th September, 1941

Vaman Anant Belsare, with seniority from 13th November, 1937.

Chimanlal Maneklal Kikani, with seniority from 16th January, 1938.

William Martin D'Souza, with seniority from 24th December, 1938.

Raghvachari Rajagopalan, with seniority from 26th February, 1941.

6th September, 1941

Ram Chandra Bose, with seniority from 14th September, 1940.

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NEW PROOF OF THE POWER OF BOVRIL

Results of Recent Research

For over 50 years Bovril has been regarded by the public as a body-builder, a stimulant and a standby in all cases of weakness. This faith in Bovril was, and is, based on the finest of all proof—personal experience. But it is natural that the exact reasons for the unique powers of Bovril should have been investigated, and experiments have from time to time been carried out by the medical profession.

In 1911, the late Professor Thompson, of Dublin, established that Bovril had the power of ministering to nutrition by the assistance it gave to the assimilation of other foods. Recently a remarkable series of experiments has been conducted at an English University. A group of medical students volunteered to undergo the unpleasant experience of allowing the passage of an œsophageal tube into the stomach so that accurate studies might be made of the effect of certain beef preparations. One of the substances investigated was Bovril.

As a result of these experiments (described in detail in the *British Medical Journal* of August 28th, 1937) Bovril emerged as 'the most effective stimulant.' Briefly, it was proved that Bovril increased the supply of gastric juices where there was a deficiency and restored it to normal. It is an accepted medical fact that people of sedentary habits generally suffer from a lowering of the essential gastric activity; Bovril rectifies this and, by facilitating the digestion of proteins, enables full nourishment to be gained.

Everyone, therefore, who is run down through strain or illness, or who feels in need of extra strength to cope with the demands of modern life, should take a cup of hot Bovril daily. It is a delicious and stimulating way of keeping fit and strong.

BOVRIL
ASSISTS ASSIMILATION

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As Development Proceeds

The needs of the growing infant call for increased amounts of mineral elements; these, with small variations in the proportions of fat, protein and soluble sugars, form the *raison d'être* for the use of Allenburys No. 2 Humanised Milk Food instead of Allenburys Milk Food No. 1 from the beginning of the fourth month.

Descriptive literature will be sent on request.

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5th November, 1941

Zahurul Hasan Khan, with seniority from 5th November, 1937.

The undermentioned Lieutenants (on probation) are confirmed in their rank:—

B. K. Bhadury. Dated 1st September, 1940.

27th February, 1941

C. Ibbotson. R. M. Vanreenen.

27th March, 1941

W. L. P. Spicer. H. R. Cara.
S. F. Seelig. Dated 22nd May, 1941.
O. B. Brears. Dated 29th May, 1941.
E. Dunsby. Dated 12th June, 1941.

12th April, 1941

J. Pereira. S. A. Sheikh.
J. R. Sen Gupta. G. L. Dutt.
R. K. Garde. K. K. Rao.
S. Agarwala. A. P. Banerjee.
C. M. Desai. B. D. P. Rao.
H. K. Musazai. R. Narasimhan.
G. S. Ahmad. W. V. Bapaih.
C. M. Patel. R. E. Sinha.
K. P. Mukherji. A. A. Shah.
T. George. D. S. Krishnamurthi.
C. I. Somaya. T. M. B. Neungadi.
P. S. Bhargava. W. S. Raju.
S. M. Dutt. V. Raghavachar.
G. Ray. A. M. Patel.
S. M. Dass. A. N. Banerji.
F. M. Khan. T. U. Poonnen.
K. A. Jabbar. B. N. Singh.
V. B. Menon. A. R. Deshpande.
P. Rangachar. S. P. Bhalla.

A. K. Thomas.

13th April, 1941

A. N. Subbaraman.

5th May, 1941

M. N. Menon. M. C. Bhattacharyya.
R. R. Lal. R. Quraishy.
S. N. Chatterjee. M. S. Prabhu.
S. B. P. Tewari. V. S. Ramaswami.
K. S. Bagchi. A. Ahmad.
K. Abraham. A. N. Ansari.
J. C. Das Gupta. C. Arumainayagam.
S. Maragathavel. P. F. Mathias.
R. Khan. S. R. Kaura.
G. S. Vingle. N. Narayen.
P. C. Badhwar. N. K. Shroff.

R. S. Gupta.

6th May, 1941

H. M. Gangopadhyay. V. K. Vaidyr.

8th May, 1941

A. C. Narula.

To be Lieutenants (on probation)

25th March, 1941

Amaya Ranjan Biswas.

5th April, 1941

Edgar Arjun Ram, with seniority from 15th October, 1940.

6th May, 1941

Frank Tandy Harrington, with seniority from 31st October, 1940.

14th June, 1941

Manindra Chandra Nath, with seniority from 14th June, 1940.

5th August, 1941

Alanghatucaren Anthony Porinchu.
Mangudi Kailasa Swaminadhan.
Krishna Nand Joshie.

6th August, 1941

Alan Brownlie Gilroy.
Bernard Arthur Lamprell.
Ogilvy James Scott Macdonald.

29th August, 1941

Harbhajan Singh.

5th October, 1941

Sudhir Chandra Ghosh.
Narayana Kartha Gangadhara Kartha.
Mohan Lal Sur.
Faqir Mohammad Khan.
Ram Layak Singh.
Gadicherla Gagannatha Rao.
Unniparambath Velayudha Menon.
Paluri Ramchandra Rao.
John John.
Thoppil Chandy Varghese.
Kuttappan Nair Ramkrishnan Thampi.
Basheer Ahmad.
Chaudhary Mohammad Umar.
Nasim Alam.
Shaikh Mohammad Yunus Farooqui.
Walter Stephen Hart.
Vithalbhai Bhailalbhai Patel.
Bir Bal Sahni.
Lakshman Raghavendra Rao Lakhkar.
Plammood House Krishnan Pandalai Sankaran Nair.
Gurbachan Singh.
Sahdev Virmathi.
Mian Abdul Maqsud.
Maniketh Chakrapani Menon.
Raman Madhavan Nair.
Anaanthacharilu Krishnaswami.
Alummootil George David.
Puthya Veetil Ramchandran.
Calidas Krishnaswami Ramachandar.
Salem Ramkrishnan Sarvothaman.
Melarcode Subramaniam Krishna Murthy.
Thomas Devairakkam.
John Edwin Abrahim.
Annaswamy Balasubramanian.
Siruvanur Narayanaswami Ganapati.
Srinivasa Ranganathan.
Somarowthu Rama Rao.
Vellore Chinnaswamy Venkatachalam.
Amar Kumar Ghosh.
Chidambara Nadar Jayaraj Aiyanadar.
Codanda Papanna Kariapa.
Namala Paul Devadason.
George Alexander Roche.
Valentine D'Costa.
Ariyanayakipuram Muthuswami Seshan.
Perumpulavil Sankara Menon.
Abdul Ghaffar.
Madduloori Wilson William.
Mohammad Arshad.
Arza Janakamohun Rao.
Anaikuppam Ramaswami Subrahmanyam.
Nagaratnam Rajasekharan.
Pisipati Venkatanarayan.
Phiroze Jehangirji Jhaveri.
Krishnaswami Kalyana Sundaram.
Varanasi Peddavadhani Somayazulu Sarma.
Nayapati Vasudeva Rao.
Rustum Bomanji Daruvala.
Raymond Vivian Norman Nayadu.
Binay Kumar Banerji.
James Kanagaraj Lucas.
Subramonia Pillai Kumara Pillai.
Jayantilal Vithaldas Karia.

6th October, 1941

Dalip Shah Singh.
Koduvayur Matilakath Unnikrashnan.
Syed Qadir Bakhsh Shah.
Thakar Singh Chohan.
Haviligi Mruthyunjaya Rao.
Mohamad Tajuddin.

5th November, 1941

Ghyasuddin Ahmed.
Remanta Kumar Das.
Dilip Kumar Sen.
Manzur Ilahi Khwaja.
Sudhir Kumar Mazumdar.
Phanindra Nath Banerjee.

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Surath Kumar Bhattacharjee.
Vishwambhar Nath Chaturvedi.
Vaithinathaswamy Swaminathan.
Krishna Pillay Mahadevan Pillay.
Ram Kumar Saksena.
Tarak Das Chatterjee.
Dinsukhlal Triphovandas Gandhi.
Kidar Nath Bali.
Frederick Maitland James.
Vinayak Santayya Achrekar.
Khagendra Nath Ghose.
Venkat Raghunath Mirajkar.
Aranvoil Babu Rau.
Pattathil Kerala Varma.
Parimal Chandra Banerjee.
Padamannore Sanjiva Rao.
Parvatha Reddy Chandrasekhara Reddy.
Balwant Sadashiv Patankar.
Mohammad Ikram.
Puthenpurail Idichandy Alexander.
Abraham Solomon Norman.
Syed Zahiruddin Ahmed.
Periyakulam Subramania Mudaliar Kumaravelu.
Asikkadu Ramanatha Natarajan.
Chadalavada Krishna Rao.
Natverlal Ratanlal Dani.
Pidathala Krishnamurthy.
Puttige Ramachandra Sastry.
Chakkiri Balakrishnan.
Jagarlapudi Subbarama Serma.
George Henray Durairaj.
Subramania Iyer Gopalakrishnan.
Ambalavath Kottayi Haridas.
Duncan John Gilbert.

6th November, 1941

Charles Frederick Seffrien Alken.
Thomas Bernard Maurice Sloan.
Chempottil Madhava Menon.
Kundadak Madhav Kudva.
Kottappurath Mohammed Kunhi Mohammed.
Asirvatham Augustus Appadorai.
Pillalamarri Jagannatham.
Kaillanmar Thodi Rarukutti Nair.
Mandayam Devasikhamahi Ramaswami.
Jeevanna Rao Krishna Rao.
Cukkemane Ramarao Chandrashekar.
Vijaykant Atmaram Rane.
Velloor Sangameswara Sastri Ramaswami.

15th January, 1942

Phanindra Nath Banerjee.
Ramaswamy Nagendran.

16th January, 1942

Gella Venkata Satyanarayana Murthi.

PROMOTIONS

The undermentioned Indian Medical Service officer is advanced to the List of Special Selected Lieutenant-Colonels:—

Lieutenant-Colonel S. S. Sokhey. Dated 5th January, 1942.

Note.—The seniority of Major P. H. Cummins, to his present rank previously notified is antedated to 26th February, 1936.

Captains to be Majors

G. B. Thomas. Dated 1st February, 1942.
R. L. Haviland Minchin. Dated 5th February, 1942.

LAND FORCES

(Emergency Commissions)

Lieutenants to be Captains

S. F. Seelig. Dated 21st September, 1941, with seniority from 22nd May, 1941.
O. B. Brears. Dated 21st September, 1941, with seniority from 29th May, 1941.
C. Ibbotson. Dated 27th August, 1941.
H. R. Cara. Dated 27th September, 1941.
W. L. P. Spicer. Dated 27th September, 1941.
B. K. Bhadury. Dated 1st September, 1941.

2nd January, 1942

B. S. Dhillon.
A. A. Qureshi.
M. A. Shakur.
Gopal Singh.
H. Khan.
A. H. Khan.
N. F. Shaikh.
T. M. Asani.
T. Banerjea.
S. G. Deosthali.
M. L. Bhagata.
M. P. N. Nambiar.
D. B. Doctor.
M. Bhattacharjee.
A. G. Rose.
Gajindar Singh.
D. S. Rege.
J. Krishnamurty.
N. C. Mehra.
K. Rajamannar.
S. D. N. Anand.
S. S. Nagi.
T. S. Row.
K. K. Jaswal.
M. A. K. Khokhar.
A. R. Sethi.
H. M. Kalapesi.
G. Hassan.
S. K. H. Uraizy.
H. S. Dhillon.
K. B. Taneja.
N. S. Ahluwalia.
Jasbir Singh.
Trilochan Singh.
S. L. Abhyankar.
A. P. Dube.
T. C. John. Dated 3rd January, 1942.

RETIREMENTS

Lieutenant-Colonel R. F. D. McGregor, C.I.E., M.C. Dated 5th January, 1942.
Lieutenant-Colonel S. C. Contractor. Dated 25th January, 1942.

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Original Articles

A RECORD OF *TRICHINELLA SPIRALIS* (OWEN, 1835) IN INDIA

By P. A. MAPLESTONE, D.S.O., D.SC., M.B., B.S., D.T.M.
and
N. V. BHADURI, M.B., M.SC. (Cal.)
(*From the Helminthological Research Laboratory, School of Tropical Medicine, Calcutta*)

THIS worm, according to Baylis (1939), 'appears to have been known to occur formerly in man in India, no recent references to it have been found in the literature'. Baylis does not give any authority for this apparent early knowledge of the worm in India, and at the time he was writing the book referred to he asked our assistance in tracing records of trichinella. We inquired from veterinary officers with many years' experience in the country in a large teaching school and the principal veterinary research establishment in India, and they all said they had never seen any signs of the infection in animals. These facts indicate that Baylis appears to be correct in stating that *T. spiralis* is by no means prevalent or the infections are so slight as to pass unnoticed. Based on this evidence it seems justifiable to claim the present as the first authentic record of the worm in India.

In the past few years we have conducted a systematic search of likely animals for evidence of this parasite and up to the present have examined 100 pigs, 100 dogs and 100 rats with negative results, but in the seventy-fourth cat we recently found a large number of larvæ.

Technique.—As the diaphragm is one of the most commonly infected muscles, this was selected for examination in every case. In the dogs, rats and cats the whole diaphragm was subjected to examination, but in pigs only a portion was taken. The muscle was finely minced, placed in artificial gastric juice and left in an incubator at 37°C. overnight. It was then put in a fine wire sieve and extracted by Baermann's technique. Hall and Collins (1937) have shown that this digestion-extraction technique is superior to direct microscopical examination of 'press' preparations when the larvæ are living, but it will not reveal dead larvæ with any certainty, as the escape of the larvæ from the sieve depends on their motility. It is therefore possible that the incidence of the infection is slightly higher than our results indicate.

This record definitely establishes the presence of *T. spiralis* in India and suggests the possibility of human infection, so a short summary of the parasitology and clinical condition, as well as an outline of the public health aspect of the problem, are set out below, because these are probably unfamiliar to most of the readers of the *Indian Medical Gazette*. At the same time it should be borne in mind that, on the evidence presented, it is very probable that practically all the medical practitioners in the country will go through the whole period of their professional life without seeing a case.

The adult worms are small and no description of them is given, as they are never seen in a human infection and only in animals experimentally infected and slaughtered at the appropriate time. This will be clear from the life history of the worm given below.

Trichinelliasis is in some respects the most interesting of all helminthic infections because it has many of the characteristics of an acute infectious fever, even to the extent that a fatal termination is not uncommon. The manifestations of the disease will perhaps be more clearly understood if the life history is given in three numbered paragraphs corresponding with the three stages into which the course of the disease is usually divided.

Aetiology and life history.—1. Larval worms, encysted in pork insufficiently cooked to kill them, are swallowed, and gastric digestion weakens the cyst wall sufficiently to allow them to escape; this occurs in the duodenum. The larvæ bury themselves among the villi of the intestinal mucosa and development proceeds rapidly. By the third day sexual maturity is reached and fertilization of the female occurs. The males die and are evacuated in the stools and the females burrow through the mucous membrane gaining contact with lymphatics and small blood vessels.

2. In about three days larval production begins (eggs are not laid) and the production rate goes on rising for five or six days, after which it steadily declines and finally comes to an end in about a month. The females die and are dealt with by phagocytes. The larvæ measure about 100μ in length by 6μ in breadth so after getting into blood vessels and lymphatics they are able to make their way throughout the body in the systemic circulation, as they can pass through the lung capillaries. With occasional exceptions, which will be referred to later, only those larvæ which reach striated muscle survive and the most heavily parasitized of these are the muscles that are in more or less constant motion such as the diaphragm, intercostals, muscles of mastication and deglutition, and the pharyngeal muscles, but some also come to rest in the muscles of the limbs.

3. After coming to rest between the muscle fibres the larvæ are at first surrounded by migratory cells and later a thin fibrous capsule is organized. This is oval with its long axis parallel with the muscle fibres. During this period the larvæ grow until they reach 0.8 to 1 mm. in length and 0.03 mm. in diameter. They lie coiled in the cyst and may live for years, the longest period recorded for man being about thirty years and for pigs eleven years according to Faust (1939). Their final fate is death and calcification of the cyst.

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Course of the disease

1. *Period of invasion or incubation.*—This is characterized by acute gastro-intestinal disturbance with nausea, vomiting and diarrhœa which may be severe and is in some cases accompanied by hæmorrhage. It is thus clear that this stage must be differentiated from food-poisoning, cholera or dysentery.

2. *Period of migration or the acute stage.*—Myositis is the main feature, and if it is remembered which are the most heavily involved muscles it is clear that there will be dyspnœa, dysphagia and interference with phonation, and there is usually a certain amount of pain in the limbs. A temperature up to 104° or 105°F. is common and in severe infections a 'typhoid state' may develop. At this time mild cases resemble influenza or another of the allied acute fevers, and more severe cases have to be distinguished from the enteric group of fevers. This merges into the third stage.

3. *The critical stage.*—The muscle pain is severe and there is œdema, especially of the face, and a certain amount of general anasarca is usual in bad cases. There are other signs of toxæmia such as cardiac and respiratory complications with cachexia, and in fatal cases the patient sinks into a state closely simulating severe enteric fever.

As a rule the patient slowly recovers because escape of toxins from the larvæ ceases, as they become encysted. The encysted and finally calcified larvæ may cause a certain amount of chronic muscular pain and disability.

The severity of symptoms is directly proportional to the number of larvæ present and it is now known that in most cases they are so few that the disease appears no more serious than a mild influenza or it may be so slight as to pass unnoticed.

Pathology.—In addition to the normal encystment in striped muscles and the damage caused by toxins liberated from the larvæ before the capsule is formed, trichinella larvæ may occasionally cause damage to other tissues. Blumer (1936) reported evidence of myocardial damage and lesions in the central nervous system caused directly by trichinella larvæ and a case with myocardial involvement and fatal termination is described by Terry and Work (1940). Evers (1939) reported finding larvæ in the cerebro-spinal fluid in twenty-five cases, some of which had definite symptoms of nervous involvement and four of them died.

A great deal of experimental work has been done on trichinelliasis in recent years, particularly in America, and the following facts have been established. Infection of the fœtus *in utero* has been proved in guinea-pigs by Roth (1936), animals may be both actively and passively immunized, and Mauss (1940) claims that there is evidence of partial immunity in the offspring of immune animals.

Diagnosis.—Diagnosis is difficult and in the initial stage virtually impossible, because there are no characteristic structures in the stools and the antibodies have not yet developed in the blood. Probably the most valuable indication is the information that the patient has had a meal of pork a day or two, previously; this is of special import when the pork has been in the form of uncooked, smoked sausage such as the Germans use so largely.

In the migratory stage, McNaught (1939) says that a common sign is the presence of 'splinter' hæmorrhages under the nails in the distal portion of the nail bed. According to Kerr *et al.* (1941) it is common to mistake trichinelliasis for measles in the invasion stage; this is further evidence of toxic damage to the small blood vessels.

In the second and third weeks antibodies have developed and complement fixation, a precipitin reaction and a dermal reaction may all be demonstrated. The antigen is an extract of dried larvæ recovered from experimental animals and washed completely free of all host substances. Eosinophilia as high as 60 per cent may be found, but eosinophilia is not of much value where high eosinophil counts are very common on account of the prevalence of many other parasites. In the stage of encystment a piece of muscle can be excised and the larvæ found by direct microscopic examination of a 'press preparation', or peptic digestion and extraction of the larvæ by Baermann's technique.

Prognosis.—Prognosis in the case of average severity is good, though a certain amount of pain and stiffness may remain permanently. In the early history of the disease, when public health administration was not so effective as it is to-day and meat inspection was not done, epidemics with a high proportion of severe cases were recorded and in some of these the mortality was as high as 30 per cent.

Treatment.—There is no specific treatment so that all that can be done is to relieve symptoms as they arise. Calcium and irradiated ergosterol have been used experimentally in rabbits, and Wantland (1934) found that the stage of calcification can be accelerated so that it begins in less than six weeks against seven to eight months in the ordinary way. This is suggested as a possible line of treatment, but a warning is issued against the possibility of causing hypercalcinosis. van Someren (1939) also suggests that gluco-calcium injections may lessen toxicity in the acute migratory stage.

Epidemiology and prophylaxis.—Trichinella seems able to invade any carnivorous animal and it is found in pigs, dogs, cats and rats. This shows that complete eradication of the worm from any country where it is endemic would be a very difficult matter. The rat is probably the most important animal in keeping the cycle going. The pig is the only animal of

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direct danger to man and when man becomes infected it means the cycle comes to a dead end.

An interesting point in the incidence of trichinelliasis that has emerged recently is that in cities meat inspection is efficient and consequently only lightly infected pigs escape detection and the degree of infection is diluted by the infected meat being mixed with clean meat in making sausages, so the actual number of infected cases is high but none of them are severe and many are not discovered at all clinically. This is shown by McNaught (1939) who estimates that 3 in 100,000 of clinically recognizable cases occur in a community in which 400 in 100,000 will be found *post mortem*. On the other hand, in the country areas where there is no meat inspection and pigs may be killed and distributed privately by a farmer to his neighbours, heavily-infected pork may be eaten in large amount by a few people so there will be a small number of heavy infections.

It is obvious from the above remarks that to prevent human infection all pork must be clean or, if not clean, rendered safe by cooking it long enough to kill the parasites, and the practice of eating pork cured but uncooked or only partially cooked should be discouraged as energetically as possible. In practice, it is not found feasible to prevent lightly-infected pork passing the most careful meat inspection possible, when the economic as well as the public health point of view is considered. Pig food should also be thoroughly cooked because pork condemned for human consumption on account of containing trichinella might easily be given raw to pigs as a means of economy, but clearly a false economy.

REFERENCES

BAYLIS, H. A. (1939) .. *Fauna of British India.* Nematoda. **2,** 231. Taylor and Francis Ltd., London.

BLUMER, G. (1936) .. *New England J. Med.,* **214,** 1229. (Abstract—*Trop. Dis. Bull.,* 1937, **34,** 31.)

EVERS, L. B. (1939) .. *Arch. Intern. Med.,* **63,** 949.

FAUST, E. C. (1939) .. *Human Helminthology.* 364. Henry Kimpton, London.

HALL, M. C., and COLLINS, B. J. (1937). *Pub. Health Rep.,* **52,** 468.

KERR, K. B., JACOBS, L. and CUVILLIER, E. (1941). *Ibid.,* **56,** 836.

MCNAUGHT, J. B. (1939). *Amer. J. Trop. Med.,* **19,** 181.

MAUSS, E. A. (1940) .. *Amer. J. Hyg.,* **32,** 75.

ROTH, H. (1936) .. *Zentral. Bakt.* 1 *Abt. Orig.,* **136,** 278.

TERRY, L. L., and WORK, J. L. (1940). *Amer. Heart J.,* **19,** 478. (Abstract—*Trop. Dis. Bull.,* 1941, **38,** 157.)

VAN SOMEREN, V. D. (1939). *Brit. Med. J., i,* 376.

WANTLAND, W. W. (1934). *Proc. Soc. Exper. Biol. and Med.,* **32,** 438.

THE TREATMENT OF WAR INJURIES OF THE EYE

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WITHIN the last two years much has been written in the journals on the treatment of war injuries of the eye, and a résumé may not be out of place as the war has now approached the gates of India and air raids may occur at any time in our towns.

From the experience of extensive heavy air attacks over Britain, war injuries of the eye have not been found to be very different from those in civil life, where industrial injuries are caused by glass, metal or other foreign bodies, and the treatment is very much on the same lines. There have been, however, a large proportion of serious bilateral injuries.

War injuries to the eye

These are classified according to Tyrrell—

I. Non-penetrating—
- (*a*) Dust and debris in the conjunctival sac.
- (*b*) Glass in the conjunctival sac.
- (*c*) Concussion injuries of the globe.

II. Penetrating but not perforating—
- (*a*) Wounds of the eyelids.
- (*b*) Corneal foreign bodies.
- (*c*) Burns of the eyelids, conjunctiva and cornea.
- (*d*) Glass in the cornea.
- (*e*) Glass in the sclera.
- (*f*) Subconjunctival metal or dust or other foreign matter.

III. Perforating injuries—
- (*a*) Metal.
- (*b*) Glass.
- (*c*) Other matter—
  - (1) Of cornea, uncomplicated.
  - (2) Of cornea, complicated.
  - (3) Of corneo-scleral junction.
  - (4) Of sclera.

Most ophthalmologists who have had experience of bombing raids are of the opinion that in eye injuries early operative interference is not quite such a necessity as we have always been taught. Cases that had to be left twenty-four hours before operation did quite well, despite the danger of infection.

I. Non-penetrating injuries

In the non-penetrating injuries the conjunctival sacs are usually filled with a mixture of mucus and dirt, and it is wise to treat these eyes to two-hourly irrigations with an alkaline lotion (2 per cent) before attempting any operative interference, and preliminary to operation to irrigate with a 1 : 1,000 silver nitrate solution. All glass should be removed from the conjunctival sac, and it will usually have to be picked

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out under local cocaine anæsthesia as it is the most tenacious of all the conjunctival foreign bodies. Concussion or blast injuries of the eye are divided into : (*a*) Hyphæmia, (*b*) rupture of the iris, (*c*) rupture of the lens capsule, (*d*) subluxation of the lens, (*e*) vitreous hæmorrhage, (*f*) dilated retina, and (*g*) commotro retinæ.

Large numbers of these cases have been seen and the orthodox treatments are well known. Traumatic detachment of the retina, whether due to concussion or a direct blow, is rare.

II. Penetrating but not perforating injuries

Wounds of the eyelids are common and the most difficult to treat. They nearly all go septic unless the edges of the wounds are excised, which is often impossible when there is much damage to the tissues. The wounds should be cleansed with warm saline, hydrogen peroxide, etc., and all obviously damaged tissues, unlikely to survive, should be excised. If possible, the edges of the wound should be sewn up but if sepsis is likely to result the wound should be left open. When there are multiple foreign bodies on the cornea they are best left alone. The pupils should be kept well dilated with oily atropine (1 per cent) and later with liquid paraffin or boro-vaseline. The foreign bodies rapidly fall out and any that do not can be taken off later.

Burns.—Most ophthalmologists agree on the danger of using tannic acid for skin burns of the face. The triple dyes give good results. Burns of the cornea are very uncommon owing to the film of tears over it. A simple and effective method is to cover the burns with *tulle gras* impregnated with vaseline and balsam of Peru (2 per cent). The *tulle gras* dressing is covered with six or eight layers of gauze wrung out in warm normal saline. Care should be taken that the dressing is kept moist by adding more saline from time to time. The gauze dressing if possible should be changed every four hours for the first few days but the *tulle gras* dressing is left in place. The latter is changed twice a day at first and later once daily.

Skin grafting should be carried out as early as possible.

Note.—Tulle gras is prepared in the following way:—Mosquito curtain net (2 mm. mesh) is cut into pieces of 9 cm. square. These are put in a metal box slightly larger in size and impregnated with the following mixture:—

Soft paraffin ..	.. 96 grms.
Balsam of Peru	.. 2 grms.

This is sterilized over a water-bath.

Glass in the cornea and sclera are dealt with in much the same way as foreign bodies on the cornea. Subconjunctival foreign matter may require excision of the part of the conjunctiva affected.

III. Perforating injuries

Glass is by far the most important cause in these injuries. It is very difficult to see, even with the corneal microscope, and difficult to extract. Fortunately in most cases the glass works its way out even from the depths of the wound. Unless the eyeball is too pulped to save there is no harm in waiting to see if the eye can be saved from removal, especially if both eyes have been seriously injured. Often patience has been amply rewarded and useful vision has resulted.

There is so far no proof, if both eyes are injured, that sympathetic ophthalmia may occur. It is often better to wait and no harm will result in delaying the removal of a protruding foreign body in the eyeball, as a fibrinous exudate will form around the piece of metal or glass and may prevent vitreous from escaping. As the injury to the eye is nearly always with other injuries of the face and body the delay will allow him to get over the state of primary shock. Glass in the vitreous is best left alone, and an eyeball should not necessarily be removed because glass is there but as a rule intra-ocular glass cases have the eye disorganized. Window glass is relatively opaque to *x*-rays, and a useful way for approximate localization is to *x*-ray the eye from front and side after fitting a Zeiss contact glass with a dot of sealing wax on it, to mark the centre of the cornea of the patient. The relative position of the shadows gives a good idea of the position of the foreign body. Another method of localization is to inject an opaque substance such as lipiodol under the conjunctiva as close as possible to the cornea, and to take an *x*-ray photograph. This will show up the curvature of the globe of the eye, and the rest of the curve could be reconstructed geometrically so as to show whether the foreign body is inside or outside the eye.

Sulphanilamide as a local measure has not generally proved to be of much value as a preventive of sepsis or as a treatment of sepsis once established, although individual doctors have spoken of its efficacy locally in a 30 per cent solution in infected wounds of the eyelids and punctured wounds of the cornea.

If possible removal of foreign bodies on the eyeball are best done under local anæsthesia, as one gets the co-operation of the patient, but if the patient is sensitive and apprehensive general anæsthesia should be employed, preferably by the intravenous route, with sodium pentothal or evipan. There is, however, sometimes difficulty in controlling the eye when this method is used. Shock is not a contra-indication to the administration of these drugs, rather the reverse, provided they are properly administered. Gas and oxygen or cyclopropane can also be used, but ether should be avoided and chloroform never used. Spicules of glass in the anterior chamber should be removed through a keratome section at the appropriate position, followed by lavage of the anterior chamber with normal saline.

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THE PREPARATION OF LIQUID SERUM FOR TRANSFUSION PURPOSES

By S. N. HAYES, F.R.C.S., F.R.C.O.G.
LIEUTENANT-COLONEL, I.M.S.
SANT RAM DHALL, M.B., M.S.
and
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THE clinical value of serum or plasma is now so well established, that no well-equipped institution can afford to be without a store of the fluid. Although citrated whole blood is necessary in a 'bank', a proportion of one citrated blood to 10 of liquid serum or plasma is a good practical arrangement. Plasma from 14-day-old citrated blood can be pooled and filtered for later use, but its processing is more tedious than that of serum. It is therefore advisable to keep for 30 days—or less if hæmolysis occurs—a sufficient amount of citrated blood for emergency purposes, and then discard it. All other blood withdrawn is used for processing as serum.

Processing serum presents no difficulties provided the closed-circuit method is used. In the method used by us during the last 2 years, there is no exposure to air—except that filtered through a large well-packed cotton-wool filter—from the time the needle enters the vein of the donor to the final packing of the liquid serum. The method is particularly suited to India where the air is heavily laden with dust. Beyond turning off the fans during the separation and pooling process, and when assembling the clarifying and filtering apparatus, no special precautions are taken, and no attempt is made to sterilize the air in the working room. We use a technique that can be described as a combination of surgery and bacteriology.

All apparatus, with the exception of Seitz filter pads, has been made locally.

Utilizing the existing medical staff, we have regularly bled 20 to 25 donors per week for 2 years, producing 6 to 8 pints of serum. Separation and pooling occupy a session of about 1 hour weekly. Clarification and filtration, a session of 1 to 2 hours weekly. The above amounts could be increased, if desired, to 40 donors weekly, and filtering 20 pints of serum without imposing an undue strain on the staff or needing additional assistance.

An institution should therefore have no difficulty in adequately providing for its own needs, and with very little extra assistance could increase its filtering capacity to 50 pints per week, as the process is practically automatic.

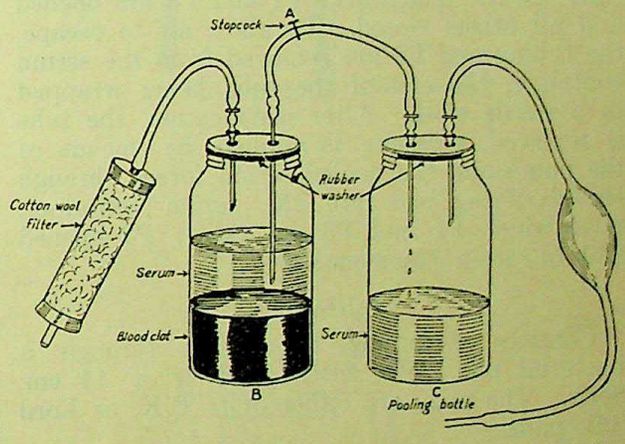
Blood-withdrawing for serum preparation

The method of blood-withdrawing has been previously described (Hayes and others, 1941). Horlick's bottles are used. The caps are tinned, perforated by 2 holes of $\frac{1}{4}$-inch diameter, and fitted with rubber washers made from a motor lorry inner tyre. (All cap washers are so made.) Bottles are specially cleaned before being taken into use (*see* appendix). The capacity is 16 ounces, which we consider a suitable amount to withdraw from the average donor. Blood for Wassermann reaction is taken from the withdrawing tube. After the bottle is filled the cap holes and edges are sealed with paraffin wax and the bottle stored at 2° to 6°C. for as long as 5 days.

Separation and pooling

The apparatus is shown in figure 1. Vacuum is obtained by means of a reversed Higginson's syringe, or a water vacuum pump. For separation of a large number of bottles, two sets of apparatus are used connected by a Y-piece to a large winchester which is connected to the vacuum. The Horlick's bottle (C) shown in figure 1 is replaced by a whisky bottle fitted with a rubber bung in which a short inlet and a long exit tube are fixed. The long glass tube is connected to the Y-piece of the pooling bottle. Each operator therefore has his own bottle in which he can observe the rate of flow of serum,

Fig. 1.



and adjust it with the glass stopcock (A) attached to the rubber tubing. The top of the Horlick's bottle is thoroughly flamed, and the 9-inch steel needle plunged sharply through the rubber washer; the stopcock is then fully opened and 2/3rds of the serum aspirated; moving the needle as required to avoid the clot, the stopcock is then closed to slow down the flow to a rapid drop, and finally to a slow drop. When as much serum as possible has been aspirated the stopcock is closed and the process repeated with another bottle.

Used needles are syringed through with cold distilled water and then boiled in distilled water.

The average time taken to separate one bottle is 6 minutes.

The pooled serum bottle is closed with a rubber cork under a flame, the neck is covered with cellophane or lint, and the bottle stored at 2° to 6°C. for as long as 5 days.

Clarification

Pooled serum is turbid, due to deposition of fat. Red cells are also present. Filtration or

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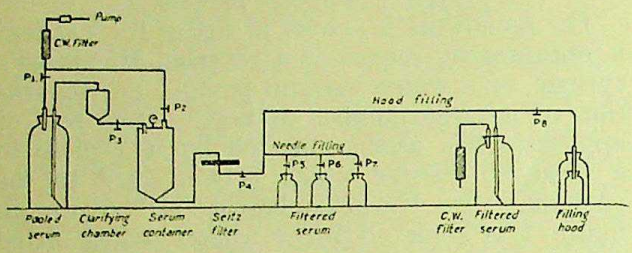
clarification is necessary, otherwise the Seitz filter-pad will clog. We clarify and filter at the same time. The combination of apparatus is shown in figure 2. Positive pressure, provided by a foot pump, is used throughout and usually 2 pounds per square inch is sufficient. A motor tyre valve is connected to the pressure tubing leading to the cotton wool air filter.

Fig. 2.



Double lines = Glass tubing.
Single lines = Rubber tubing.

In clarifying, pooled serum is forced through the clarifying chamber containing a pad (*see* appendix) into the serum container. It is then 'gin' clear. Pinchcocks P1 and P8 are opened and all others closed. To allow air to escape, the tubing and P2 are removed from the serum container, the end of the tube being wrapped in a sterile cloth. After clarification, the tube is replaced, pressure is applied by means of the pump and the pooled serum forced through the clarifying pad into the serum container, after which P1 and P3 are closed, P2 opened and filtration commenced.

Filtration

Consists of forcing the serum through a bacterial pad. The filter used is a 14 cm. Seitz. The pads are either Seitz E|K. or Ford S.B. pads.

With the above, 2 litres can be filtered in approximately 1 hour, and 3 litres can be filtered through one pad, provided the closed circuit method is used.

All pinchcocks between the filter and bottles to be filled must be open. At first, pressure is applied slowly—4 to 5 strokes of the pump will suffice followed by an interval of 2 to 3 minutes, in order that the filter pad may become thoroughly wet. The pressure is then gradually raised to 2 pounds and maintained.

Filling

Two methods are described :

A. *Needle method.*—Three bottles (gin or whisky) can be used for one filter. Two glass T's are inserted into the tubing—to the free ends and also to the end of the tubing—adaptors and pinchcocks (P5, 6 & 7) are fitted.

Bottles fitted with screw caps pierced by one ¼-inch hole and rubber washers are sterilized in the high-pressure sterilizer with their caps loose. The cap is flamed, and an intravenous needle is plunged through the central hole in the cap and fitted to the adaptor on the T-piece. Samples for sterility tests can be taken in a similar manner (2 c.cm. of serum to 20 c.cm. sloppy agar).

B. *Hood method.*—The serum passes directly from the filter into a large bottle (filtered serum). When full, P4 is closed. A bottle is placed under the filling hood, P8 is opened and pressure applied to the air filter. A pint bottle is filled in one minute. It is then removed and capped under the flame. This method is useful when automatic working is required as several bottles can be connected in series, or very large bottles used. Until the bottles are filled the only attention required is that of maintaining 2 pounds of pressure in the serum chamber.

After filling, the caps of the bottles are screwed tight and paraffin wax applied to the central hole and edges. The cap and neck are covered with cellophane.

APPENDIX

Cleanliness of apparatus

It is essential that the inside of all apparatus should be thoroughly clean. Efforts should be concentrated on the *inside* and not the outside of all tubes. Rubber tubing should be of short lengths, to facilitate cleaning. This applies to all tubings, whether glass, rubber, or the narrow lumen of needles. After use, tubings should be cleaned under pressure with cold water. The final washing, prior to sterilization, should always be in distilled water. *Too much time cannot be spent on cleaning the inside of tubing used for intravenous work.*

Preparation of rubber

New rubber must be boiled for 30 minutes in alkali (0.1 per cent NaOH or washing soda 2 teaspoonfuls to half a pint of water). It is then rinsed thoroughly in tap water, followed by distilled water. At fairly frequent intervals rubber should be re-treated.

Preparation of bottles and glassware

Bottles and glassware should be first boiled in soapy water for 15 minutes, washed in tap water and immersed in the following mixture for 24 hours : Potassium dichromate (commercial) 100 gm., sulphuric acid (commercial) 250 c.cm., water 750 cm. Following this they should be thoroughly rinsed in tap water until water is neutral to litmus, and finally in distilled water.

Preparation of clarifying pad

Perfecta pulp is the best material to use, if available. It is broken into pieces, immersed in distilled water for 12 hours and then autoclaved.

Equal parts of half-beaten paper pulp and white blotting paper make an efficient substitute. They are soaked in tap water for 24 hours in a large bowl. The mixture is then thoroughly beaten with a large fork or egg beater, and the water removed by passing through a very fine sieve. This is repeated until

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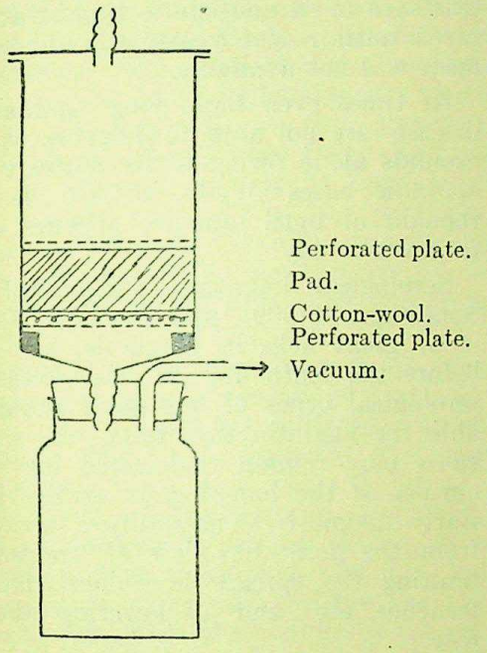
the mixture is white—when distilled water is used, for about 5 changes. It is then placed in Horlick's bottles, capped and autoclaved twice. The component parts of the clarifying chamber are shown in figure 3. The perforated plate and layer of cotton wool are inserted into the

Fig. 3.



Preparation of clarifying pad.

chamber prior to sterilization. Before the assembly of the completed apparatus (figure 2), the clarifying chamber is fitted into the bottle, and the pulp poured in and rammed with a rammer made of a rubber cork on a glass rod, starting at the centre. During this operation a vacuum is created which extracts the remaining water. Failing this, the lid of the chamber may be applied and positive pressure applied. The ramming must be thorough, and as much water as possible removed. The upper perforated plate is then applied and the lid screwed down. A pad 4 inches × ½ inch will clarify 2 litres of serum.

Sterilization of bottles and other apparatus

Bottles, after thorough cleansing and rinsing in distilled water, are sterilized at 20 pounds pressure for one hour. Before sterilizing, the caps are screwed down tightly and loosened half a turn. If a vacuum is required, as in blood-withdrawing bottles, the caps are again tightened following sterilization and when the bottles are hot.

Sietz filters containing the pads are sterilized as above. The serum container and clarifying chamber can be sterilized in the sterilizer or by attaching a steam pipe, and raising the pressure to 5 pounds for one hour. Glass and rubber tubing are best sterilized by boiling in distilled water for half an hour.

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A NEW TYPE OF DRIP REGULATOR FOR INTRAVENOUS TRANSFUSION WORK

By S. N. HAYES, F.R.C.S., F.R.C.O.G.
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THE ordinary all-glass regulator is fragile and difficult to clean—and nowadays to obtain. The type described below (figures 1 and 2) is

Fig. 1.

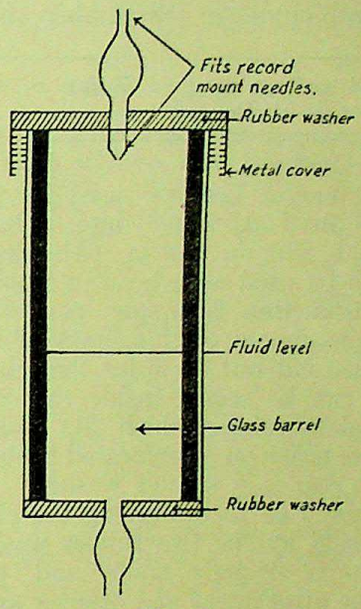
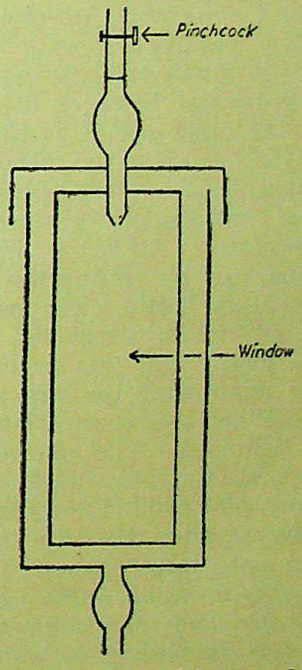


Fig. 2.



an attempt to provide a drip regulator as near as possible indestructible, with an adaptor to fit

(*Concluded on next page*)

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REFERENCE

HAYES, S. N., DHALL, S. R., SAMI, M. A., BAMFORD, P., and RAO, V. K. (1941). *Indian Med. Gaz.*, **76**, 649.

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WEIL'S DISEASE WITH SPECIAL REFERENCE TO ITS DIAGNOSIS AND TREATMENT*

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Mount Abu

THIS note is based on the final results of observations and treatment of 60 consecutive controlled cases treated during the height of a Weil's disease epidemic (September and October 1938), out of 250 cases treated by me from October 1937 to January 1939 in the Andaman Islands.

Weil's disease appears to include a variety of conditions in which fever, severe prostration, albuminuria and possibly jaundice are prominent symptoms; but many cases of true Weil's disease have escaped diagnosis, because the existence of a non-icteric type was not recognized until recent years, and laboratory diagnosis was not available.

At times even those long familiar with the disease are not able to diagnose it on clinical grounds alone owing to its protean nature. In sporadic cases Weil's disease is often not thought of until jaundice appears on the fifth to seventh day.

Serological diagnosis as discussed by Walch-Sorgdrager (1939) and by Das Gupta (1938) is of great help in diagnosis, but usually not before the tenth day of the disease. Various serological types of leptospira should be available for agglutination tests, or some genuine cases may remain undetected for want of inclusion of the homologous strain in the test. Early diagnosis is naturally a great advantage from the point of view of treatment and of limiting the spread in mines, labour camps, trenches, etc., and of lowering the mortality rate.

Clinical diagnosis

In endemic areas, with some experience of the disease, it is not difficult to detect a case. In unsuspected areas which are by no means uncommon, it is desirable that the following signs and symptoms should be borne in mind :—

Prostration.—This is out of all proportion to the fever, which ranges between 100°F. to 102°F. in 95 per cent of cases.

Pains in the body.—Acute and even excruciating pains confined to the muscles of the lower limbs, neck and to a lesser extent of the arms and the body are present at the very onset. Pain over the epigastrium, the precordial regions, the liver, and the gall-bladder is often present as an early symptom.

Conjunctival injection.—Injection of the conjunctivæ without photophobia is one of the earliest signs and is often associated with patchy hæmorrhages. The presence of this latter manifestation presages a severe attack. There is usually no associated coryza or subsequent conjunctivitis.

Fever.—The onset is sudden and is accompanied by marked prostration. The temperature usually varies from 100°F. to 102°F. In the majority of cases it comes down by lysis to normal within 3 or 4 days, although occasionally it may persist for a week or 10 days. Hyperpyrexia (except after intravenous saline) has been noticed in a few cases only. In 30 per cent of cases there has been a small secondary rise after the initial temperature has been normal

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*Redrafted and abridged by Editor in consultation with Professor B. M. Das Gupta.

(*Continued from previous page*)

two record mount needles—used for the transference of distilled water into dried plasma bottles that are *in vacuo* (American type). It can also be used as a bead or wool filter.

The construction is simple; consisting of an outer case made out of thin brass tubing. Two windows are cut out in order that the dropper and fluid can be seen. Inside the casing is a piece of glass tubing which fits loosely. The tubing rests below on a perforated rubber washer. Inside the cap is a second washer. When the cap is screwed on to the casing the glass barrel is firmly held by the two rubber washers.

The cap is strongly made and the upper rubber tube attachment and dropper are made to fit record mount needles, thus providing a two-needle mount for use with American type dried serum which is packed *in vacuo*.

One needle is thrust through the rubber cork of the distilled-water bottle, which is then inverted, and the other needle is thrust through the cork of the dried serum bottle. Distilled water then flows into the dried plasma bottle.

The flow is controlled by a pinchcock placed above the regulator. All air is firstly expelled from the apparatus by raising the needle level with the transfusion bottle. The needle is raised and lowered until all air is expelled. The pinchcock is then closed and the level of the fluid regulated by unscrewing the cap and allowing air to enter. When the required level is reached the cap is tightened. The pinchcock is then opened to regulate the rate of flow. At one drop per second, one pint of fluid flows in three hours. Then after use unscrew the cap, take to pieces and place in cold water, remove washers and wash thoroughly in cold water. Rinse in distilled water—dry and reassemble. Sterilization can be effected by boiling or autoclaving (20 minutes at 15 pounds).

Replacements

Rubber washers can be made out of rubber corks, old motor tyres, etc.

Glass barrels can be made of glass tubing of suitable size. After cutting, the ends can be smoothed by rubbing on a smooth whetstone.

The regulator was made for me by The Pearl Surgical Works, Lahore.

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for a week or so. This recrudescence is probably due to some complications, *e.g.*, bronchitis, nephritis, cystitis, to food taken surreptitiously or to leaving the bed too soon. I have found bacilluria and cystitis to be the cause of secondary fever in 5 per cent of my cases.

Jaundice was present in about half of the cases under discussion. It may appear as early as the third day or may be delayed till the sixth day of the disease. Early appearance of jaundice associated with some of the other signs and symptoms, or with albuminuria alone should leave no doubt as to the diagnosis, especially in areas where yellow fever does not exist. But its absence or delayed appearance should not mislead anyone who has seen non-icteric cases of the disease. The degree of jaundice is proportionate to the severity of the case. Itchiness of the skin is conspicuous by its absence.

Renal symptoms.—In 95 per cent of cases albumin appeared on the second or third day and varied from a trace to a large amount. Albuminuria is said to be transient, by many workers, but in my series of cases it persisted for 2 to 7 weeks. A sudden and early albuminuria in an apparently healthy person, in an endemic area, is most significant. In fact, it is the most constant sign, and perhaps the only sign in some cases, when the symptoms are very mild. At the early stage of the disease the sediment shows no casts, but these may appear later, together with red blood corpuscles, pus cells and cylindroids.

In jaundiced cases bile was present in varying quantities. As a rule it is absent in non-icteric cases, although in a few it was demonstrable.

Retention of urine and anuria occurred in some cases. The latter is an indication of a very grave condition, and unless energetically treated almost invariably leads to a fatal issue. These complications occur late in the course of the disease.

Respiration and pulse.—Respiration is usually shallow and slow except in cases with early congestion of the lungs.

In an average case, the pulse rate at the onset is rarely over 100 per minute even with a temperature of 102°F. At the end of the third or fourth day, it drops even below normal rate though the temperature may vary from 100°F. to 102°F.

A pulse rate of 100 per minute or over, especially when associated with jaundice, is an unfavourable sign. Failure of the pulse rate to fall with the course of the disease points to cardiac and respiratory involvement. A soft and rapid pulse is found in 30 per cent of cases. In those cases where prostration and muscular pains are very severe, where hæmorrhages have supervened, and in highly jaundiced patients, the heart beat is feeble, or scarcely audible. This appears to indicate that the cardiac muscle shares early in the general myasthenia. This is confirmed at *post mortem*, when the heart is found to be pale—if not yellow—and flabby, with pericardial fluid in excess.

Cardiac embarrassment or a burning sensation in the chest.—This is often complained of at the early stage and is one of the most distressing features of the disease. It makes prognosis very grave, especially in nervous and restless cases.

The *tongue* is typical of any acute specific fever such as typhus, plague and smallpox. In mild cases, it is only slightly coated and fairly moist, especially if the diet includes plenty of fluids, glucose and fruit juice. But in severe cases with marked toxæmia, it is dry and red at the margins and later becomes coated and is protruded with difficulty (parrot-tongue).

Liver, spleen and gall-bladder.—Whether associated with jaundice or not, slight enlargement of the liver, especially its left lobe and gall-bladder, occurs in 50 per cent of cases. It is remarkable, however, that the spleen is rarely enlarged or tender.

Hæmorrhage.—This may occur early or late, may be slight or severe and usually starts on or about the fourth day of the disease, as epistaxis, hæmoptysis and less commonly as melæna, hæmatemesis and extensive petechial hæmorrages. Hæmaturia and hæmoglobinuria are rare symptoms, occurring only in 3 among 250 cases seen. These symptoms were absent in the cases in which urotropin was given.

Later symptoms.—It is remarkable that during the early stages of the disease in most cases there were no signs of gastro-intestinal irritation, as seen in cases of other specific infectious diseases. But later, when the fever is high and jaundice and toxæmia are intense, one finds nausea, vomiting, hæmatemesis, hiccough, melæna and abdominal distension of varying degrees. Of these, persistent or recurring hiccough, and vomiting* with meningism possibly of cholæmic origin, are probably the most troublesome and worst symptoms from the point of view of treatment and prognosis.

Laboratory diagnosis

Blood picture.—During the first 3 or 4 days of the illness as in some other infectious fevers there is a leucocytosis, the numbers varying from 10,000 to 15,000 per c.mm. with an increase in the percentage of polymorphonuclear leucocytes (70 to 85 per cent).

Blood cultures made in suitable media during the first week of the disease are usually positive. Positive cultures are rarely obtained after the seventh day.

Animal inoculation

Guinea-pigs were inoculated intraperitoneally with blood obtained during the first week of

*Persistent hiccough and vomiting are usually associated with peritonitis, but cases with these symptoms which ended fatally did not reveal the signs of peritonitis on autopsy in my series of cases, so that one concludes that these symptoms are of toxic origin.

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illness. In the inoculated animals jaundice was either absent or appeared later, and leptospira could not be demonstrated before the seventh day after inoculation.

Urine examination.—In a large percentage of cases the spirochæte can be demonstrated in the urinary deposits after efficient centrifugalization. I found cultures gave good results, but staining of the deposit by Fontana's method proved unsatisfactory.

Serological tests have already been referred to.

Differential diagnosis.—Negative findings are of considerable importance in arriving at a diagnosis, especially in areas where malaria, typhus, dengue and sand-fly fever are prevalent. The district where these observations were made luckily enjoys freedom from most of the above diseases and the diagnosis was, therefore, easy. The absence, in an average case, of headache, rigors, early rash, photophobia, coryza, early nausea, rapid pulse, or respiration is distinctly helpful.

Post-mortem findings.—These vary according to the duration of the disease and the cause of death. Post-mortem examination has been done on 20 cases since 1937. Practically all of them came under observation very late, with severe cholæmia and died either from hæmorrhages, lung congestion, anuria or sudden cardiac or respiratory failure. On opening the body the tissues were found to be intensely jaundiced. The serous fluid in the abdomen, thorax and pericardium has increased in amount and was bile-stained. In some cases where jaundice was slight during life it was conspicuous and definitely demonstrable *post mortem.*

Liver—enlarged, usually dark-red in colour and sometimes with brown or grey necrotic areas.

Spleen—congested.

Kidneys—generally enlarged, red or pale-yellow with occasional brown or grey necrotic areas.

Suprarenals—congested.

Bladder—empty in most cases.

One or two patients that died early showed congestion of the stomach and intestines.

It was possible to perform autopsy in many cases within a few minutes of death. It is extremely difficult to demonstrate leptospira in organs if they are examined after 6 to 12 hours, even in typical fulminant cases. Yet the examination conducted within half an hour of death easily revealed the spirochæte, which showed a great predilection for the heart muscle. In two nephritic or cardiac cases without jaundice the kidneys showed hardly any leptospiræ, whereas the cardiac muscle revealed a very large number. Outside an epidemic area such cases might be easily mistaken for acute congestive cardiac or renal failure.

Cause of death

(*a*) Cardiac and respiratory failure,
(*b*) anuria and uræmia,
(*c*) hæmorrhages from lungs, stomach or intestines,
(*d*) cholæmia,
(*e*) pneumonia.

Some atypical forms of the disease

I. Malaria-like onset. Fever lasting for 24 to 48 hours only. Late albuminuria; hæmorrhages during afebrile period.

II. Complete absence of pains. Slight fever with prostration, albuminuria and jaundice. Very few cases of this type seen.

III. The pneumonic or influenzal type with massive consolidation of one or both lungs. This type is fairly common.

IV. The 'melæna' type with fever and profuse hæmorrhage.

V. The cerebral or meningeal type with early unconsciousness, delirium, etc.

VI. The cardiac or nephritic type simulating acute congestive cardiac failure. This constitutes a large percentage.

VII. Intensely jaundiced type without 'black vomit'.

VIII. The 'yellow fever' type with 'black vomit'.

IX. The non-icteric type. The cases are generally mild. About 50 per cent of my cases belong to this group.

X. A chronic meningeal and a chronic icteric form were encountered, and these two types comprised 10 per cent of cases.

Treatment

The treatment of this serious disease is very cursorily dealt with in most textbooks of medicine and monographs dealing with the subject. A full description of the treatment adopted by me is given below; it is mainly symptomatic yet is sufficiently specialized to be dealt with *in extenso.*

Rationale of treatment.—After treating a large number of cases of Weil's disease my conclusion is that the broad principles should be (*a*) ensuring rest, (*b*) quickly eliminating the toxins, and (*c*) 'anticipatory therapy', *i.e.,* preventing the onset of the grave symptoms and sequelæ, such as hæmorrhages, cardiac failure, toxæmia, cholæmia, anuria, persistent hiccough and vomiting, hyperpyrexia, parotitis and cystitis.

(*a*) *Rest.*—Absolute rest in bed is essential in view of the possibility of sudden heart failure due to cardiac musculature being involved during the acute and convalescent stages. Early administration of sedatives was found necessary owing to the intensity of muscular pains and restlessness. In most cases tincture hyoscyamus in ℥ss to ℥i doses and A.P.C. powders were sufficient to relieve pain, but in some severe cases where restlessness was due to cardiac pains and meningism, veronal grs. x to xv in 6 ounces of warm milk morning and evening was found to be most beneficial. Paraldehyde is also probably useful.

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(*b*) *Elimination of toxins by*—(*i*) *diuretics and diaphoretics.*—If the patient was seen on the third or fourth day of the disease the following mixture was given for 2 or 3 days :—

℞		
Potassii citratis	..	grs. xx
Spiritus ætheris nitrosi	..	♏ xx
Tincturæ hyoscyami	..	ʒss to ʒi
Calcii lactatis	..	grs. x
Aquam camphoris	..	ad ℥i

Fiat misturam. *t.d.s.*

But if the patient came under observation after the fourth day or was in a very toxic condition from the very onset, the following mixture proved efficacious :—

℞		
Urotropinæ	..	grs. x or xv
Glucose	..	ʒi
Aquam anethi	..	℥i

Fiat misturam. *t.d.s.*

preceded every half hour by another mixture, *viz* :—

℞		
Acidi sodii phosphatis	..	grs. xv
Spiritus ætheris nitrosi	..	♏ xx
Tincturæ hyoscyami	..	ʒi
Aquam camphoris	..	ad ℥i

Fiat misturam. *t.d.s.*

Here urotropine acts primarily as a biliary and urinary antiseptic, and secondarily perhaps as a spirochæticide against the leptospiræ, which are believed to lodge inside such organs as the liver, gall-bladder and kidneys, when the organisms disappear from the peripheral blood after the fourth or fifth day of the disease. The mixtures should be discontinued after 8 or 10 days, or earlier if hæmaturia supervenes. In my series of cases, except for a boy of seven, there was not a single case that developed hæmaturia or hæmoglobinuria, though copious quantities of albumin were detected daily in many cases. Moreover, urotropin, being excreted by the meninges, proved a valuable remedy in the meningeal type of the disease. It also prevented subsequent bacilluria and parotitis. 'Catagone' by intravenous injection was tried with great success in 10 cases in place of urotropin.

(*ii*) *Purgative.*—On admission, a single dose of magnesium sulphate or sodium sulphate—ʒii, was given and continued in ʒi doses every morning for 3 or 4 days preceded by either blue pill—grs. ii or pil. colocynth. co. grs. ii at bedtime, with the object of ensuring at least two motions a day. More frequent motions are to be avoided and the dosage of the salt and the pills have to be regulated accordingly.

(*c*) *Anticipatory therapy.* (*i*) *Hæmorrhages.*—As soon as a clinical diagnosis of Weil's was made hæmostatic serum 5 c.cm. was given intramuscularly, and usually hæmorrhages were rare after its administration. If hæmorrhages did occur later, they were not severe and a further dose of 5 c.cm. of the serum was sufficient to check them. If serum is not available calcium chloride grs. xv *t.d.s.* may be given orally.

(*ii*) *Cardiac failure.*—At the least sign of any cardiac pain or embarrassment and/or when epigastric pain was marked, a mustard plaster obliquely over the epigastrium to cover the heart, left lobe of the liver and gall-bladder was applied for half an hour or so, and subsequently glycerine was applied on the area. In the case of threatening cardiac failure, intravenous saline in small doses (with 5 per cent glucose) was tried in several cases with good results. A glucose-brandy mixture with tinct. nucis. vom. ♏x was given to cases with soft feeble pulse, coramine, camphor in oil, adrenalin, strychnine, digitalis, etc., were given subcutaneously, *s.o.s.* in moderately severe cases.

Toxæmia, cholæmia, and anuria.—My previous practice of administering normal saline 12 to 15 ounces with 5 per cent glucose intravenously was soon discontinued except in very severe toxæmic cases or in those that refused food. Subcutaneous saline* was tried in some cases but under epidemic conditions 'in the field', this procedure is probably unsafe and it was given up in favour of warm high rectal saline 12 to 20 ounces, with or without 5 per cent glucose, two or three times a day till the eighth day or longer according to the severity of the case.

Hiccough and vomiting.—If persistent, these symptoms signify a grave prognosis due to subsequent dehydration and cardiac embarrassment. Therefore early administration of intravenous† and rectal salines as well as sedatives, as stated before, was employed in these cases. In addition to the above measures hydrogen peroxide solution (10 volumes)—ʒi in an ounce of cold water, tinct. iodi.—♏iii in water every 15 minutes, mustard plaster, etc., were effective in some cases.

Hyperpyrexia.—In the earlier series of cases where hyoscyamus and veronal had not been given, some deaths resulted from hyperpyrexia and convulsions.

Cystitis and parotitis.—As already stated, early administration of urotropin completely controlled these complications in my later series of cases.

Specific treatment.—Though tried only in 10 cases my experience with anti-leptospira serum

(*Concluded on next page*)

*In some 3 or 4 of the early cases hæmatoma developed at the site of the injection and later suppurated. This was thought to be due to some extraneous infection. But as suppuration also set in in a few later cases when the same saline, with the same aseptic care, did not produce suppuration in other cases, it may be concluded that autogenous infection must have been the cause.

†Sometimes adrenalin solution ♏iii was added to each 10 ounces of saline for intravenous injection.

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TRANS-GRAFTING OPERATION FOR TRICHIASIS AND ENTROPION OF THE UPPER LID

By H. A. H. PATHAN, L.C.P.S., S.S.M.S.
In Sub-charge, Rai Bahadur Goverdhandass Motilal Eye Hospital, Karachi, Sind

AMONGST various complications of trachoma, trichiasis and entropion are the most common complications requiring surgical intervention. Different operations have been devised by various surgeons but a few only have been practised, *e.g.*, the commonest being (*i*) electrical epilation, (*ii*) Jaesche-Arlt's operation, (*iii*) Snellen-Streatfield's operation, and (*iv*) grafting of mucous membrane from the lip in the inter-marginal space.

All these operations are a matter of individual choice and have only a limited usefulness, as, where one operation is useful in one case, the same may not be applicable in another, and when applied to the worst cases the results are often unsatisfactory.

The modern operation of grafting of mucous membrane from the lip in the intermarginal space, though apparently it looks to be a very sound and logical one, has in practice been found difficult and its results are not what have been hoped for. The sepsis of the mouth and the subsequent sepsis in the wound grafted and the resultant sloughing and absorption of the graft are such drawbacks that the surgeon is compelled to revert to his old methods*.

Bearing these facts in mind, Lieutenant-Colonel B. F. Eminson, I.M.S., has devised a simple transgrafting operation for trichiasis and entropion of the upper lids, which meets the need of practically every case. It is a very simple one, is fit for every case in an advanced stage, and the results are permanent and satisfactory. The cosmetic defects are negligible and no complications have been seen amongst his 97 cases, operated on in the above institution.

Technique

The patient is prepared as usual. A few drops of cocain, 4 per cent solution, are put in the cul-de-sac and an injection of 1/200 gr. hyoscine hydrobromide is given about 20 minutes before the operation. The lids are anæsthetized with 2 per cent novocain solution containing a little adrenalin chloride. About 1 c.cm. on an average is sufficient for each lid.

Instruments

A horn-plate,
A small scalpel,
A forceps (dissecting or fixation),
A pair of scissors,
A small needle, preferably a curved one,
A needle holder, and
Horse-hair or silk sutures.

The assistant introduces the horn-plate below the upper lid and puts it on the stretch.

First stage—(*a*) The surgeon makes an incision in the inter-marginal space, covering its whole length, leaving 1 mm. or a little more from each canthus. The incision should be a bit deeper in the centre than on the sides, and care should be taken not to cross the roots of lashes in the incision.

(*b*) A second incision of the same length is made parallel to the anterior lid-margin and about 2½ to 3 mm. away.

(*c*) A third incision is made 2½ mm. above the second and joins with a curve at the two ends of the second incision (figure 1).

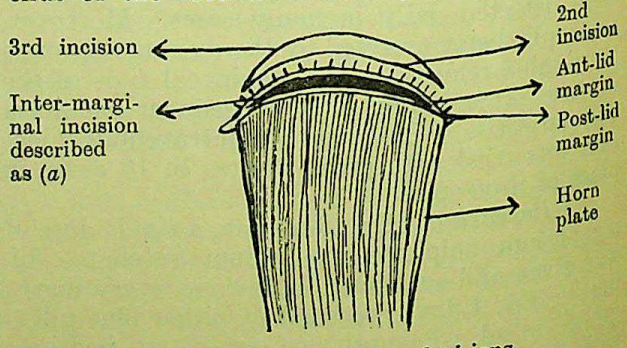

Fig. 1.—Showing three incisions.

Second stage—(*a*) The incisions 2 and 3 are deepened down (3rd being slightly more than the 2nd) until superficial fibres of orbicularis

* Many ophthalmic surgeons will not agree with this criticism, and will prefer to support MacCallan's view that van Mulligan's operation rarely fails and is the operation of choice.—EDITOR, *I. M. G.*

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in doses of 40 to 60 c.cm. intravenously was very disappointing. The failures might have been due to the difficulty in obtaining a polyvalent and potent anti-serum against the different local strains of leptospira*. Moreover, the serum is expensive and said to be effective only in the earlier stages of the disease.

Summary and conclusions

1. Weil's disease is a specific infective disease and is more widely distributed than is generally believed. It may make its appearance in severe epidemic form under certain weather conditions and, as in the last war, under certain camp conditions which appear to favour outbreaks.

2. The possibility of Weil's disease should be remembered in dealing with any case of obscure acute jaundice, early or late.

3. Diagnosis of Weil's disease is not a difficult matter in a clinical side room equipped with dark-ground outfit.

4. Early diagnosis of Weil's disease is essential.

5. A simple and efficient method of treatment is described.

REFERENCES

DAS GUPTA, B. M. (1938). *Indian Med. Gaz.*, **73**, 449.
WALCH-SORGDRAGER, B. (1939). *Bull. Health Organization, League of Nations*, **8**, 143.

[* At least four different serological strains of leptospira have been isolated in the Andamans.—EDITOR, *I. M. G.*]

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are included. As the skin retracts, it results in the formation of an elliptical skin-flap in the centre of a wound on the lid surface, hereafter to be called wound 2 (figure 2).

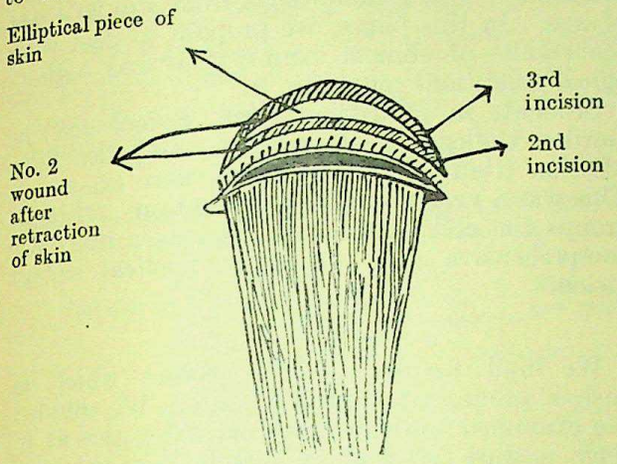

Fig. 2.—Showing deepening of incisions nos. 2 and 3 and formation of the elliptical piece of skin and wound no. 2.

(*b*) The distal ends of this elliptical flap of skin are now raised by dissection but the middle third is left attached (figure 3).

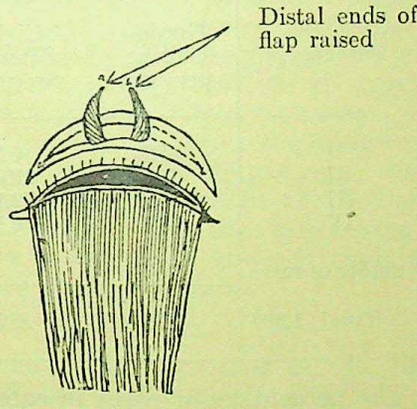

Fig. 3.—Showing distal ends of elliptical piece of skin raised and middle third attached.

Third stage—(*a*) The flap of skin lying between the inter-marginal wound and the upper wound 2 is undermined in its centre by thrusting a knife and bringing it out in the inter-marginal space, thus connecting the wounds 1 and 2, by the undermined narrow gap (figure 4). Care should be taken not to cut the roots of the lashes in the flap.

(*b*) The elliptical flap of skin in the upper wound is now transferred through this gap to the lower wound by catching with forceps passed through the inter-marginal space and bringing it down. It is spread and approximated in the inter-marginal wound by the ends of forceps, scissor blade or point of the knife (figure 5) where it lies securely and shows little tendency to be displaced.

Fourth stage.—This concludes with closing of the wound on the lid-surface (remaining after transferring the elliptical graft down to the inter-marginal space) with two simple sutures of horse-hair or silk thread and covering with a piece of sterilized gauze soaked in sterilized vaseline (figures 6 and 7).

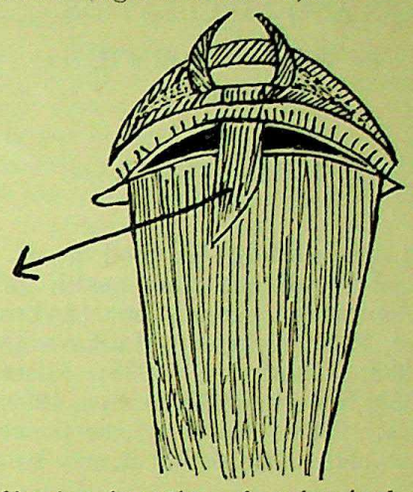

Fig. 4.—Showing formation of undermined gap with knife passed from upper wound no. 2 to inter-marginal wound.

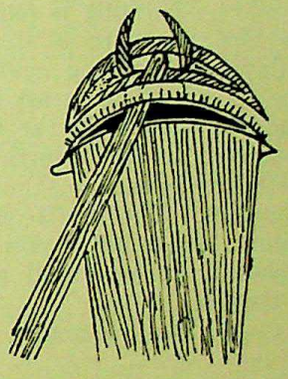

Fig. 5.—Transferring the elliptical piece of graft with a forceps passed from the undermined gap.

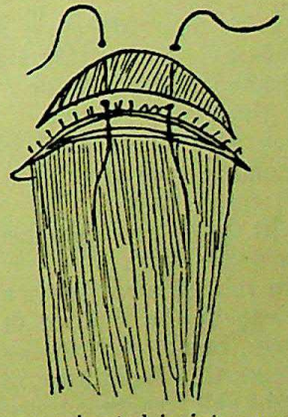

Fig. 6.—Graft approximated in inter-marginal space and sutures put to upper wound.

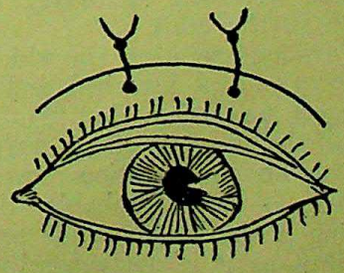

Fig. 7.—Graft and sutures both in position.

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HEALTH SURVEY OF PUNJABI BOYS: SKELETAL SYSTEM, LYMPHATIC ORGANS AND CIRCULATION

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Subject of the study.—A good many surveys of physical conditions and health in Indian children have been carried out (Aykroyd and Rajagopal, 1936; Aykroyd, Madhava and Rajagopal, 1938; Chatterjee, 1938; Mitra, 1939; Singh, 1939; Shourie, 1939; Wilson, 1939; Wilson and Mitra, 1938). However, the population of India is so heterogenous that it may be of value to add, to the surveys already carried out, one from the Punjab.

In a separate paper (Fabisch and Hamburger, 1941) we have dealt with biometrical data from more than 1,500 Punjabi boys from 5 to 20 years of age. In this paper, we propose to deal with the results of clinical examination and pathological conditions met with.

Students in a Mission High School and in Gordon College in Rawalpindi, and also in a Mission High School in Sialkot, were examined. This was a yearly routine examination. Of these groups the college students are under the most comprehensive and continuous medical supervision.

1. *Posture*

We shall discuss first the posture which is such a prominent clinical feature. We divided the examined students into four categories as to their posture so that I stands for category 'good', II for 'fair', III for 'poor' and IV for 'very poor'.

TABLE I

Distribution of posture categories among Punjabi students

Category	Gordon College, per cent	High School, per cent	Sialkot, per cent
I	31.7	0.1	46.0
II	41.6	27.3	33.0
III	20.2	72.1	19.0
IV	6.5	0.5	2.0
Number of cases			
Total: 1,594	675	812	107

The percentage of cases in category IV is fortunately quite low in all three institutions. The high percentage in category III and the low one in category I in the high school is due to the complete absence of physical training in these town-dwelling children. The school does not provide for physical education. The Sialkot school passes the two other groups in category I. This is due to the intensive physical training upon which this school places much importance, already in the younger classes. The situation of the school buildings outside the city and the close supervision of the boys in boarding halls might be contributing favourable factors.

An analysis of the figures of Gordon College students for separate age groups shows that category I contains more students with higher age. That might demonstrate the improvement of posture through training. The figures for category II are almost constant, while category III becomes smaller in the older classes. That is the result of shifting of students from this category to category II and from there to I, while the physical education becomes more effective.

(*Continued from previous page*)

After-treatment.—Nothing is required excepting a gentle cleaning with a sterilized saline swab every day and covering again with sterilized vaseline gauze. The graft is complete and firm, and the sutures in the upper wound should be removed on the fourth day. After that a little sterilized vaseline should be applied to the lid-margins. The graft-piece becomes gradually thinner and after a period of 6 to 8 months is smoothly incorporated with the surrounding lid-tissues.

Advantages.—1. It is a sound and logical operation.

2. The technique is very simple and needs no elaborate preparations nor a competent assistant.

3. There is no fear of sepsis as the transferred graft-piece is made thoroughly aseptic. It may be cleaned with spirit or even could be painted with tincture of iodine.

4. The base of the elliptical piece of graft being pedunculated, the nutrition is complete and the graft never dies.

5. The graft never gets detached with cleaning, as is the case with mucous membranes, which may be rubbed away with a swab, in an attempt to clean at the time of dressings.

6. The base being pedunculated the graft never curls, and this facilitates its approximation on the right side, whereas mucous membrane generally curls and the wrong side may be approximated, resulting in drying and subsequent death of the graft.

At first a sling-operation (in which the ends of the flap were kept attached and the centre was detached) was tried, but the flaps often sloughed and the cosmetic effects were not satisfactory. The above operation was gradually developed. It is quite probable that others may be doing a similar operation or have described one, but as it is not generally described in textbooks, and has been found so satisfactory, that it is considered worth publishing.

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In the high school there is only 0.1 per cent in category I. The highest percentage is found in category III and there is no improvement in the situation with increasing age.

2. *General condition*

In the classification of the children examined as to their state of general condition we followed the same plan as described in the previous paragraph.

TABLE II

Distribution of categories of general condition

Category	Gordon College, per cent	High School, per cent	Sialkot, per cent
I	57.3	0.6	36.0
II	20.3	46.6	47.0
III	17.2	52.4	15.0
IV	5.2	0.4	2.0
Number of cases			
Total: 1,582	650	825	107

The situation is here about the same as is found in the analysis of the posture categories. There are very few high school students in category I. This school is frequented by city children. A great number of their parents belong to economically weak classes. The children, therefore, do not enjoy the compensation of the simple though wholesome food, which comes into effect with the Sialkot children who are all of rural origin. The high percentage of college students in category I is easily explained through positive social selection.

3. *Thorax*

We have found a rosary (that is, the bead like swelling of the costal epiphyses) in 29.9 per cent of all high school boys. As the rosary is considered a sign of rickets in the earlier periods of life, we can state that nearly one-third of these boys have been subject to rickets. That compares unfavourably with the 2 per cent rickets found by Wilson (1939) in 406 Kashmiri children, although she too took account of the lesser degrees of the affection, *e.g.* enlarged epiphyses (*see* also D. C. Wilson, 1931).

There has been considerable discussion about the occurrence of rickets in tropical and subtropical areas. From literature and theoretical consideration we can conclude that living in a tropical or subtropical climate, as such, does not necessarily protect against rickets. We know that the amount of ultra-violet rays in the daylight increases with decreasing geographical latitude and increasing altitude above sea level. But this rule is modified as to the actual protective effectiveness of the ultra-violet, by various factors. Firstly, dust and vapour particles, etc., reduce the amount of ultra-violet rays which actually reach the lowest levels of the atmosphere (Kestner and Borchardt, 1929). In most seasons the extremely dusty air of Rawalpindi is surely one of the factors responsible for the high rickets incidence observed. Secondly, provided that even in low latitude, great altitude, and clear atmosphere sufficient ultra-violet light reaches the ground, it might not become effective. Such is the case with Mohammedan women and children who under certain religious rules (purdah system) are almost continuously living indoors (Hutchinson). The same holds good for the women who are living in narrow valleys of Kashmir, Baltistan, and other tracts of mountainous Central Asia. These valleys are poor in light and the women succumb to the adult equivalent of rickets, osteomalacia (Wilson, *loc. cit.*). In the Elizabeth Newman Hospital, of the Church Mission Society* in Srinagar, Kashmir, there were recorded :

TABLE III

Occurrence of pathological deliveries due to osteomalacia in Kashmir

Time of observation	Total midwifery cases	Normal cases	Classical Cæsarean	Latzko Cæsarean	Craniotomies
			for contracted pelvis		
17-10-38–17-10-39.	183	123	17	6	8
17-10-39–1-8-40.	165	114	17	7	8

All cases of pathological labour not due to osteomalacia are not included in this table. The number of craniotomies is rather too low, as some more were done, according to the records, for delayed infected labour. Some of these are probably also caused by deformed osteomalacial pelvis. But even our conservative figures show what frequency osteomalacia has in Kashmir, where rather low latitude, great altitude and clear atmosphere would let one expect a good ultra-violet supply.† Malnutrition certainly contributes to this amazing osteomalacia incidence. Thirdly, rickets may occur if the intake of provitamin is insufficient. We have found among our children many badly fed ones. It is understandable that they suffer even though enough ultra-violet reaches them. The rays do not find the provitamin in the skin to activate it into the actual vitamin D‡.

* We are obliged to Dr. I. Friedheim, M.D., who made these data available in a personal communication.

† *See* also the data on Himalayan osteomalacia by G. F. Taylor and C. D. Marshall Day, 1940, *Brit. Med. Journal*, 17th Aug., 1940, p. 221.

‡ That there are other points to be considered in the ætiology of rickets is shown in papers by Mellanby and others, as discussed in the *Brit. Med. Journal*, 31st Aug., 1940, p. 292. Calcium precipitating substances in certain cereals, such as phytic acid = inositolhexosephosphoric acid, may act as rachitogenic factors.

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4. *Spine*

TABLE IV

Occurrence of spinal deformities in Punjabi students

	Scoliosis, per cent	Kyphosis, per cent	Lordosis, per cent	Kypho-scoliosis, per cent
High School ..	10.5	16.7	17.2	0.12
Gordon College	2.5	4.2	.1.0	0.14
Number of cases	High School: 834, Gordon College : 693			

Table IV shows the percentage in which the four deformities occur, related to the total number of cases examined.

The percentage of scoliosis in the various age classes remains in the high school at about the same level. Kyphosis increases its incidence with increasing age from 5 per cent with 5 years to 25 per cent with 14 years, indicating the deformation of the spine through prolonged studies in bad attitude. Kyphosis shows the highest incidence of these three anomalies of posture capable of correction (scoliosis, kyphosis, lordosis) among college students. Lordosis decreases from 40 per cent with 5 years to 5 per cent with 15 years. We put this in relation with the very protruding abdomen of little boys, observed so frequently. This is perhaps the result of the predominantly carbohydrate-containing and bulky diet as well as of the low tonus of the abdominal muscles.

5. *Extremities*

TABLE V

Occurrence of anomalies of the lower extremities in Punjabi students

Condition	Gordon College	High School
Pes planus ..	76 = 11 per cent	33 = 4.9 per cent
Genu valgum ..	23	9
Genu varum ..	14	13
Crus valgum ..	4	3
Crus varum ..	19	..
Pes valgus ..	7	13
Miscellaneous ..	3	..
Total number of deformities.	146	71

Among the students examined, anomalies of the lower extremities were found 146 and 71 times respectively. These figures contain also combined anomalies, as for example pes valgus and genu varum occurring in the same person. About a quarter of the observed diseases are combined. We arrived therefore at the following approximate percentages: Gordon College 16 per cent, high school 7.7 per cent. The low incidence of anomalies of the lower extremities in the high school is remarkable, especially considering the figures of anomalies of the spinal column. The explanation for this divergent behaviour can be given as follows. The spinal deformities can be corrected with improved muscular force and exercise, that is with increasing age; therefore the high figures for the younger high school pupils than for the college students. The bulk of the foot and leg anomalies is formed by cases with pes planus from which 11 per cent of the college students suffer as compared with only 4.9 per cent of the high school boys. These anomalies require a higher body weight and more time for their development.

6. *Teeth*

TABLE VI

Occurrence of tooth affections in Punjabi students

Condition	High School (934 boys), per cent	Gordon College (657 students)			
		Europ., per cent	Indian, per cent	Indiff., per cent	Total, per cent
Affection of gums.	0.0	22.0	28.0	31.0	26.6
Tartar ..	54.4	33.0	38.0	42.0	37.1
Caries (gross incidence).	15.6	13.0	14.0	21.0	14.6

We have examined teeth and gums for three affections :—

(1) The incidence of inflammatory and regressive changes from simple gingivitis to real alveolar pyorrhœa;

(2) The occurrence of tartar deposits;

(3) The incidence of gross caries. We understand by gross caries the cavities which are visible without the help of dental instruments, using only the tongue depressor for naked-eye inspection.

We have inquired from the college students their method of oral hygiene. The use of tooth brush and tooth paste we called the European method. The Indian school method is the employment of the *miswak* or *dantan*, a twig of the neem tree (*Melia azardirachta*), or other indigenous trees if neem is not available. One end of the stick is made, through prolonged chewing, into a fairly soft crude brush which, after the chewing, is used for mechanical cleaning and gum massage. The sticks contain mainly astringent factors in the bark. Into the group 'indifferent' we have collected those who are using both methods irregularly or neglect their mouths altogether.

The absence of inflammatory gum conditions among the high school children is remarkable, as hardly any of them cleaned their teeth. The tremendously high incidence of tartar, however, prepares the field for the later common gum

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affections which reach, in the college students, 26.6 per cent. The percentage of caries is almost the same in high school boys and college students. That coincides with the report of Boyd, 1940, that there is no apparent correlation between degree of cleanliness of the teeth and gums, and the tendency for caries to progress or to retrogress.

The difference, however, between the caries incidence we have found and the one in American children, as observed by Knutson, Klein and Palmer, 1940, is very big, even admitting that our figures would be higher with the use of more refined explorative methods. They found in children aged 6 years 16 per cent with one or more carious permanent teeth, and in children aged 15 years, 96 per cent. We can here but state this difference without attempting to give an explanation. A geographical analysis of the caries problem is, to date, too difficult. Many papers from all countries provide material about caries incidence (in India Wilson, Mitra, Shourie, Singh, etc., *loc. cit.*). The calculations do not always differentiate caries in deciduous and permanent teeth, others calculate the caries incidence in the total number of permanent teeth. In some papers it is not clear which diagnostic methods were used. In short, there is no common standard of examination and calculation which should allow the desired analysis.

The occurrence of the three discussed conditions remains within the same level whatever oral hygiene is employed. However, those who use the European method have the lowest incidence of all three groups of affections, perhaps not so much on account of the method employed but rather as a result of the increased attention towards teeth, earlier consultation of a dentist, and better diet.

7. *Tonsils and lymph nodules*

One hundred and twenty-six out of 639 (= 18.2 per cent) of the college students and 23 out of 107 (= 21.6 per cent) of the Sialkot school boys showed really enlarged tonsils. We found that the percentage did not decrease with age.

One hundred and forty-five out of 834 (= 17.3 per cent) of the high school boys and 43 out of 693 (= 6.2 per cent) of the college students showed enlarged submaxillary, cervical, and/or occipital glands. Between 6 and 8 years there is a maximum with about 28 per cent of boys with enlarged glands, and a minimum of about 6 per cent between 14 and 15 years in high school boys. In college students there are 8 per cent with 16 years and only 2 per cent with 20 years. Interesting is the difference in the behaviour of tonsils and glands, which latter show a marked tendency to disappear spontaneously, while tonsils remain. It throws a sidelight on histopathological problems. The purely lymphatic tissue of the lymph nodules reacts in a way different from the mixed lympho-epithelial tissue of the tonsils.

Comparing our figures with those found in other Indian groups, it is revealed that children from rural districts and from the Assam tea workers' families have much lower percentages, down to 9.8 per cent, while the town-dwelling children of better class or well-to-do parents in Calcutta rank above our figures, up to as much as 42.3 per cent, children with enlarged tonsils (*see* Mitra and Wilson and Mitra, *loc. cit.*).

8. *Heart*

In our examinations, we laid special stress upon the testing of the heart. The usual functional heart test of counting the pulse before and after certain exercise was not considered sufficient. The heart examination was in all the college students carried out as follows :—

A. Pulse rate one minute before and after 10 knee bends.

B. Percussion and auscultation.

C. Blood pressure.

D. The functional test : counting of pulse rate with the help of a stop-watch in 5 15-second intervals for one and a quarter minute. That results in a 'pulse picture' which allows one easily to see whether recovery after exercise takes place normally. The 15-second rate should come back to normal in the 5th quarter minute. Table VII shows the percentage of students in age classes which do fulfil this recovery test satisfactorily.

TABLE VII

Occurrence of unsatisfactory functional heart test

Age and percentage ..	13	%	14	%	15	%	16	%	17	%	18	%	19	%	20	%	21	%
Cases of slow recovery ..	..	..	6	43	18	23	35	24	36	16	15	12	11	13	6	11	1	4
Number of cases	3	..	14	..	78	..	144	..	141	..	129	..	84	..	53	..	24	..

Among 693 students 115 cases of slow recovery = 16.6 per cent.

The reduction of the incidence of slow recovery is perhaps too favourable a result of the physical education during college life. There were 14 cases of murmurs on auscultation, but only one case of definitely established organic lesion, *i.e.*, mitral incompetency. All 14 cases showed slow and insufficient recovery. It was perhaps a matter of chance that no more organic lesions were discovered, as in a new class of 220 students not yet included in this survey, two

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A PRELIMINARY STUDY OF THE RIDEAL-WALKER COEFFICIENT VALUES OF CERTAIN INDIGENOUS ESSENTIAL OILS

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Introduction

THE medicinal use of *Ocimum basilicum* Linn., *Ocimum sanctum* Linn., *Curcuma aromatica* Salisb., *Hemidesmus indicus* R. Br., *Pistacea integerrima* Stew. and *Homalomena aromatica* Schott. has long been in vogue in India. Some of these plants are considered to possess marked antiseptic properties and are empirically used for such action. Thus, the infusion of *Ocimum basilicum* is used in gonorrhœa, diarrhœa, dysentery and ringworm. The juice of *Ocimum sanctum* is supposed to cure catarrhal bronchitis and ringworm; *Curcuma aromatica* is used in conjunctivitis, otorrhœa, eruptive fevers, and scabies; *Hemidesmus indicus* in syphilis, leucorrhœa, conjunctivitis, and thrush. *Pistacea integerrima* is believed to possess tonic and expectorant properties and is also used in psoriasis and dysentery. *Homalomena aromatica* is employed in skin diseases.

It is an established fact that essential oils sometimes show definite antiseptic properties. For instance, essential oil obtained from *Eucalyptus cneorifolia* contains different fractions, of which austrabol and cryptal have carbolic coefficients, 13 and 12.5 respectively. This is also true for the thyme oil which has a carbolic coefficient of 25.

In view of these facts, it was of interest to study the Rideal-Walker coefficient values of the above-mentioned oils and to ascertain firstly what specific action they would possess against *Bacterium typhosum*, and, secondly, whether some of them could not be used as antiseptics. The unsatisfactory conditions of coal-tar distillation in India and the difficulty in obtaining the higher fractions of coal-tar derivatives for manufacturing disinfectants of high Rideal-Walker coefficient increased still more the importance of this problem. As some of these plants, such as *Ocimum* varieties, grow very extensively in India the possibility of their utilization in the manufacture of disinfectants would be of economic importance. The present paper aims at elucidating this point.

Experimental

1. *Method of extraction of essential oils.*— Of the seven essential oils studied by us, those from *Ocimum basilicum, O. sanctum* and *Curcuma aromatica* were distilled in the Rakshit Laboratory, Ghazipur, and supplied to us by Mr. J. N. Rakshit. Essential oils from *Hemidesmus indicus, Pistacea integerrima* and *Homalomena aromatica* were extracted in the Department of Chemistry of the School. The method followed for the extraction of these oils was quite a simple and general one, and can be summarized as follows :—

The coarsely powdered drug was moistened with water and macerated. It was then distilled in steam, and the condensed water along with the essential oil collected. When the quantity of oil was sufficient to separate in a layer it was collected by means of a separating flask. When the quantity was small the distillate was salted out and then shaken up with ether. The ether was removed and the residual oil preserved.

2. *Physical and chemical constants.*—The colour of the different oils is variable. Essential oil of *O. basilicum* is light-brown in colour, of *O. sanctum* (red and green varieties) brown, of *C. aromatica* pale yellow, of *H. aromatica* yellow, of *H. indicus* brown and of *P. integerrima* light yellow. All of them possess strong aromatic odours, characteristically distinct in each case but difficult to define. The physical and chemical constants, such as the boiling point, refractive index, specific gravity, optical rotation, saponification and iodine values, of these essential oils are being studied at present. As this work is not yet complete, useful data

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(*Continued from previous page*)

cases of organic heart diseases were found, both mitral incompetency.

The measurements of blood pressure did not prove a great help for detecting pathological conditions in such serial examinations.

Summary

From routine clinical examinations of about 1,500 Punjabi students, data on posture, general condition, and pathological occurrences in skeletal, lymphatic, and circulatory systems are compiled.

REFERENCES

AYKROYD, W. R., MADHAVA, K. B., and RAJAGOPAL, K. (1938). *Indian J. Med. Res.*, **26**, 55.
AYKROYD, W. R., and RAJAGOPAL, K. (1936). *Ibid.*, **24**, 419.
BOYD, J. D. (1940) .. *J. Amer. Dental Assoc.*, **27**, 750.
CHATTERJEE, A. C. (1938). *Indian J. Pediat.*, **5**, 136.
FABISCH, W., and HAMBURGER, H. J. (1941). *Indian J. Med. Res.*, **29**, 613.
KESTNER, O., and BORCHARDT, W. (1929). *Klin. Woch.*, **8**, 1796.
KNUTSON, J. W., KLEIN, H., and PALMER, C. E. (1940). *J. Amer. Dental Assoc.*, **27**, 579.
MITRA, D. D. (1939) .. *Indian J. Med. Res.*, **27**, 441.
SHOURIE, K. L. (1939). *Ibid.*, **26**, 907.
SINGH, N. (1939) .. *Ibid.*, **27**, 453
WILSON, D. C. (1931) .. *Lancet, ii*, 10.
Idem (1939) .. *Ibid., i*, 1019.
WILSON, H. E. C., and MITRA, D. D. (1938). *Indian J. Med. Res.*, **26**, 131

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concerning these points could not be introduced into this paper, but will form the subject-matter of a separate communication from the Department of Chemistry.

3. *Description of the method.*—The standard technique of the British Standards Institution was followed. The Lister Institute strain of *Bact. typhosum* of 1931 was used for the test. Phenoleum of Merck was utilized as the standard for comparison. Eupeptone not being available at present, bactopeptone (Difco) had to be substituted in the standard broth media.

The preparation of different dilutions of the essential oils was done in sterile distilled water, using triethanolamine oleate, 1 gm. per 100 c.cm. of solution, as the emulsifying agent.

The mean results of our experiments are given in the table :—

TABLE

The comparative Rideal-Walker coefficients of seven essential oils of indigenous origin

Name of oil	Carbolic coefficient
1. *Ocimum basilicum* ..	7
2. „ *sanctum* (green)	6
3. „ „ (red) ..	3
4. *Curcuma aromatica* ..	< 1
5. *Hemidesmus indicus* ..	< 1
6. *Pictacea integerrima* ..	< 1
7. *Homalomena aromatica* ..	< 1

Discussion

It is evident from the table that, of the seven essential oils, judged from the standpoint of Rideal-Walker coefficient values, the *Ocimum* group proved to be the most potent, *O. basilicum* and *O. sanctum* (green variety) showing carbolic acid coefficients of 7 and 6 respectively may be considered to have quite appreciable antiseptic properties against *Bact. typhosum*. This value compares very favourably with that of many disinfectants manufactured by local firms, which show lower figures.

The carbolic coefficient of *Ocimum sanctum* (red) is only 3 and that of *Curcuma aromatica, Hemidesmus indicus, Pistacea integerrima* and *Homalomena aromatica* is about 1. It would naturally be useless to investigate any further the disinfecting properties of this latter group. Whether they possess any specific bactericidal action against some other organisms, *in vitro* or *in vivo*, is a question which could be settled only by further investigation.

Conclusions

1. The Rideal-Walker coefficient values of seven indigenous essential oils have been studied for the first time by following closely the standard method for the test.

2. The family *Ocimum* and especially *basilicum* and *sanctum* (green) showed definite antiseptic properties against *Bact. typhosum*.

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LATENT SYPHILIS AND FALSE-POSITIVE WASSERMANN REACTION IN THE TROPICS

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IN a previous communication (Greval, Sen Gupta and Das, 1938) it was shown that (*i*) latent syphilis was encountered in an unselected hospital population rather infrequently, (*ii*) that many conditions other than syphilis were responsible for a positive Wassermann reaction, and that (*iii*) the Wassermann-positive rate in an unselected Indian population was likely to be *under* 10.25 per cent rather than 20 to 22 per cent of the previous writers. The work commenced in connection with the aforesaid items, in the Carmichael Hospital for Tropical Diseases, Calcutta, in 1937, has been continued. More figures are now available. They confirm the previous findings and reduce the Wassermann-positive rate still further.

Wassermann reaction of 1,525 cases admitted for diseases other than syphilis

The reaction was in the majority of cases repeated at intervals. The accompanying

(*Continued from previous column*)

3. This action appeared to be negligible with *Ocimum sanctum* (red), *Curcuma aromatica, Hemidesmus indicus, Pistacea integerrima* and *Homalomena aromatica*.

4. It is suggested that further studies on the specific action of the essential oils of *Ocimum basilicum* and *Ocimum sanctum* be made in the treatment of infections for which they are now being only empirically used.

Acknowledgments

Our thanks are due to Mr. J. N. Rakshit, Prof. S. Ghosh, and his staff for the extraction of these essential oils.

SELECTED BIBLIOGRAPHY

BRITISH STANDARD INSTITUTE (1934). *Monograph: Standard Technique for determining the Rideal-Walker Coefficient of Disinfectant.*

CHOPRA, R. N. (1933) .. *Indigenous Drugs of India.* Art Press, Calcutta.

DYMOCK, W. (1890–93). *Pharmacographia Indica.* Kegan Paul, Trench, Trübner Co., Ltd., London.

WATT, G. (1889–96) .. *A Dictionary of the Economic Products of India.* Supdt., Govt. Printing, India, Calcutta.

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tabular statement gives the initial and subsequent reactions of two series of cases.

The cases with 3 possible exceptions (obscure nervous complaint suspected to be syphilitic and treated with malaria) were suffering from diseases other than syphilis.

The technique of the reaction was that of No. 4 of the Medical Research Committee, 1918, (now Council) modified and standardized by the senior writer (Greval, *et al.*, 1930, 1938, 1939, 1940). The essential features of the technique are : (*i*) the quantity of complement added to the serum control is 2 M.H.D., (*ii*) red cell suspension and antigen are standardized, (*iii*) complement is classified, (*iv*) antigen-complement system is adjusted according to the class of the complement found, (*v*) repeatable, therefore comparable, reading is obtained by the aid of titrated controls of pooled positive sera, and (*vi*) a positive reaction with 4 M.H.D. of complement and uncholesterinized antigen is termed +++.

In the tabular statement the last but one item, 'finally positive or doubtful' reaction, is recorded to make the result comparable with those of treated syphilis : the persisting doubtful reaction of a recently treated case of syphilis still indicates a diagnosis of syphilis; on the other hand, an initial doubtful reaction in the absence of presumption of syphilis does not indicate a diagnosis of syphilis. For the purpose of detecting the false-positive Wassermann reaction the last item, 'finally positive (excluding doubtful)', gives the desired figure.

Two series are tabulated separately to bring out the variations such figures are subject to; statistical analysis, involving mathematical refinements, is not attempted.

The following points emerged :—

(*i*) Percentage of +++ cases is low. It is $\frac{100 \times 11}{1,525} = 0.72$. In the Wassermann register of this laboratory which undertakes serological work for nearly all hospitals and clinics in Calcutta, and which tested 15,615 sera in 1939-40, it is of the order of 6. Probably +++ cases give a truer latent syphilis rate than other cases, although this reaction has been encountered in at least one non-syphilitic case (Greval, *loc. cit.*). In series one, the reaction of half of such cases fell to ++ without anti-syphilitic treatment.

(*ii*) Of 90 ++ cases, 24 could not be repeated : of the remaining 66, 21 became negative and 9 doubtful (±) without anti-syphilitic treatment.

(*iii*) Of 33 + cases, 3 could not be repeated: of the remaining 30, 17 became negative and 5 (±) without anti-syphilitic treatment.

(*iv*) Of 63 ± cases, 20 could not be repeated : of the remaining 43, 28 became negative without anti-syphilitic treatment.

(*v*) There was a rise in reaction too during the course of the disease. Two reactions rose from ++ to +++, 4 from + to ++, 8 from ± to + or ++. This rise is as much a proof of the non-specific nature of the reaction as the fall in *ii*, *iii* and *v*.

Conditions other than syphilis responsible for a positive Wassermann reaction

The following conditions have been held responsible for a false-positive reaction :—

1. Other diseases—leprosy, yaws, malaria, trypanosomiasis, pinta and bejel frequently. Septicemia, endocarditis, pneumonia, tuberculosis, relapsing fever, spotted fever, typhus fever, scarlet fever, infectious mononucleosis, pernicious anæmia, leukæmia, xanthomatosis, severe jaundice and lymphopathia venereum less frequently. Others very infrequently.
2. Bacterial growth in serum.
3. Excess fat and digestive products in serum.
4. Passive transfer from mother.
5. High barometric pressure increases tendency.
6. Improperly prepared, titrated and mixed reagents.
7. Probably some 'cured' cases of syphilis (Smith, 1940).

Item no. 6 may be eliminated. It is not likely to interfere in a standardized technique.

Attention is drawn to three other conditions : (*i*) kala-azar, (*ii*) 'lecithinophile eosinophilia' and (*iii*) 'lecithinophile hepato-gastro-intestinal syndrome'. The first two conditions have been discussed previously (Greval, Sen Gupta and Napier, 1939; Greval, 1940) : the third will be summarized briefly now :—

Lecithinophile hepato-gastro-intestinal syndrome.

It is a state of ill health (*i*) characterized by chronic indigestion, distention after food, looseness of bowels or constipation, enlargement of liver with or without jaundice, discomfort or diffuse pain in the epigastrium or right hypochondrium, low fever, loss of weight, anæmia and a positive or doubtful Wassermann reaction, and (*ii*) not covered by a definite diagnosis of a known disease of the digestive system or of syphilis. All the signs and symptoms may not and usually do not occur together. A strong enough combination in the absence of the usual manifestations of syphilis, however, establishes the presumption that one is not dealing with intentionally concealed, naturally latent or congenital syphilis, but with a more-or-less chronic and hitherto undescribed disease or disorder of the digestive system. The presumption is converted into proof when the positive or doubtful reaction weakens and disappears with the improvement and reappears with the relapse.

The condition is non-syphilitic. The positive or doubtful Wassermann reaction is false. It will be better to call the reaction simply an affinity of the blood for lecithin in complement fixation. Hence the adjective lecithinophile.

The disappearance and reappearance of the positive (or doubtful) reaction are too rapid and intimately connected with the characteristic clinical symptoms to be regarded as the usual

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variations in a true positive Wassermann reaction due to meteorological causes (Hoverson, *et al.*, 1935) and even passage of time (Becker, 1937). Variations due to qualitative differences in the complement are effectively controlled by the adjustment of the antigen-complement system in the writers' technique (Greval, Chandra and Das, *loc. cit.*).

The writers have read with great interest a publication by Bakhsh (Bakhsh, 1940) on gastro-intestinal disorders related to liver. The Wassermann reaction, however, was not done on the cases reported (private communication from Bakhsh).

The syndrome attracted the senior writer's attention some time ago and was mentioned in two communications quoted in the present communication but was not then so named. A communication on this item alone has been sent abroad, but it is not yet known whether it reached its destination and will be published.

The Wassermann-positive rate in an unselected Indian population

Twenty-two per cent (Iyengar, 1919) and 20 per cent (Lloyd, Napier and Mitra, 1930) were the positive rates given by previous workers. The rate calculated from the figures collected in this communication is :—

$$1,525 : 100 : 134 = \frac{13,400}{1,525} = 8.7 \text{ per cent, crude}$$

or

$$1,525 : 100 : 82 = \frac{8,200}{1,525} = 5.3 \text{ per cent, corrected.}$$

The crude rate is based on the number found positive initially. The corrected rate is based on the number found positive finally, with the improvement in the disease the patients were suffering from *and without anti-syphilitic treatment*. The period of observation was limited. It is reasonable to suppose that an extension of the period will reduce the corrected figure further. The true-positive rate, indicative of latent syphilis, must be *below* 5.3 per cent. Only this figure will be compatible with the economic and social orders of things in India. Nearly everybody of marriageable age in this country is married and his main concern is food, not gratification of illicit sexual desires.

Besides, this figure is a figure for a town. The figure for the country, where the scope of irregularities of human conduct is much smaller than in towns, will be lower.

The reasons for previous workers' high rate appear to be two : (*i*) the technique did not at times differentiate between a doubtful and a positive reaction, and (*ii*) the reactions of cases suffering from certain diseases were not repeated.

Presumption of syphilis in Wassermann-positive cases and latent syphilis rate

Of the 134 initially positive and 63 doubtful cases in the two series, signs and history of syphilis could only be obtained in 23 cases distributed as follows :—

	1st series	2nd series
+++	4	2
++	5	8
+	1	1
±	2	0
	12	11

As these cases were admitted for diseases other than syphilis, 23 per 1,525 or $\frac{100 \times 23}{1,525} = 1.5$ per cent could be regarded as the latent syphilis rate, provided other causes leading to a false-positive reaction in a cured case of syphilis could be eliminated.

The true ascertainable latent syphilis rate must be under 1.5 per cent.

Summary

1. Wassermann reaction of 1,525 cases admitted for diseases other than syphilis is tabulated. Some positive reactions disappeared, others weakened with the improvement in the

A tabular statement of Wassermann reaction of two series of cases totalling 1,525

Series	I	II
Period	10-7-39 to 9-7-40	10-7-40 to 15-4-41
+++ :—	6 :—	5 :—
Not repeated ..	1	1
Same reaction ..	2	4
Fell to ++ ..	3	*nil*
++ :—	36 :—	54 :—
Not repeated ..	8	16
Same reaction ..	9	17
Rose to +++	1	1
Fell to + ..	5	3
Fell to ± ..	5	4
Turned — ..	8	13
+ :—	21 :—	12 :—
Not repeated ..	*nil*	3
Same reaction ..	3	1
Rose to ++ ..	4	*nil*
Fell to ± ..	3	2
Turned — ..	11	6
± :—	41 :—	22 :—
Not repeated ..	13	7
Same reaction ..	6	1
Rose to ++ ..	3	2
Rose to + ..	1	2
Turned — ..	18	10
— :—	785	563
Total tested:—	869 :—	656 :—
Initially positive, +++, ++ and +.	63	71
Finally positive or doubtful.	44	52
Finally positive (excluding doubtful).	36	46

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THE EFFECT OF STOCKING RICEFIELDS WITH SULLAGE ON ANOPHELINE BREEDING AT KHURDA ROAD

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THE report of a preliminary experiment on the effect of stocking ricefields at Khurda Road with sullage during the dry season, on anopheline breeding, was published in the *Indian Medical Gazette* (Rao, 1941). As the results were promising, it was considered necessary to repeat the experiment on a large scale, not only to confirm the previous findings, but also to ascertain the effects of this method on the rice crop.

It has been recognized that naturalistic methods of malaria control are of particular importance because they have special adaptability to rural areas, where, up to the present time, little or nothing has been accomplished (Hackett *et al.*, 1938). Naturalistic measures are even of greater importance in those rural areas where the local vectors breed in large numbers in ricefields. On account of their great extent, ricefields are very costly to deal with. They cannot be effectively drained away in those large areas where the flooding of rice is entirely dependent on an intermittent seasonal rainfall (Hackett, *et al.*, *loc. cit.*). Even in areas that can boast of an irrigation system, drying of fields for two or three consecutive days in each week cannot be effective during periods of daily rainfall (Russell and Rao, 1940). The use of chemical larvicides in ricefields frequently leads to opposition, which, though groundless, is difficult to overcome. Therefore, any antilarval measures, which do away with chemical larvicides and which do not interfere with the irrigation of the ricefields, are to be welcomed.

Rice cultivation is not properly carried out in many areas where malaria exists to any marked degree. The fields are not well manured or ploughed in the dry season, which results in a poor crop. The *ryots*, therefore, continue to be poor, and, as a result of lowered resistance to disease, they fall easy victims to malaria. The whole thing moves in a vicious circle. 'Malaria, weak men, late ploughing, more anophelines, poorer food, more malaria' (Senior White, 1936). Any method, which prevents breeding of anopheline vectors without the aid of chemical larvicides and which, at the same time, improves the rice crop, is desirable.

Besides better crop and malaria control, there are other considerations too. In most villages, sullage accumulates near houses or is allowed to run to waste and, in any case, it is not only not disposed of in a proper manner but it is allowed to become a positive nuisance. Sullage waters are eminently suitable for the breeding of *C. fatigans*, which carries the infection of filariasis. Any method which attempts to dispose of the sullage satisfactorily constitutes an improvement in rural sanitation, besides controlling filariasis, which is widely prevalent in certain parts of Madras and Orissa.

The place where this experiment (as the previous one) was carried out is Khurda Road, a railway settlement on the east coast of India, about 280 miles south of Calcutta. The sullage from this settlement empties itself into a *kutcha* drain, which passes through a large number of ricefields and is finally led into the Daya river, one of the deltaic branches of the Mahanadi. Usually, the *ryots* divert the sullage into their fields during the dry season, to facilitate ploughing. When they take the sullage, they do not

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(*Continued from previous page*)

patients' conditions *and without antisyphilitic treatment*. Some doubtful and positive reactions grew stronger without any manifestation of syphilis.

2. Attention is drawn to three conditions responsible for a false-positive Wassermann reaction: (*i*) kala-azar, (*ii*) 'lecithinophilia' and (*iii*) 'lecithinophile hepato-gastro-intestinal syndrome'.

3. Wassermann-positive rate for unselected Indian population, indicative of syphilis, must be below 5.3 per cent for towns. For the country it should be lower.

4. The ascertainable latent syphilis rate for the cases admitted, as judged by the Wassermann-positive rate, was 1.5 per cent. It must be really lower.

The reaction given collectively opposite the signs are the initial reactions, not those observed later as a result of rise or fall.

REFERENCES

BAKHSH, I. (1940) .. *Indian Med. Gaz.*, **75**, 344.

BECKER, S. W. (1937) .. *The Million Americans Have It.* J. B. Lippincott Co., Philadelphia.

GREVAL, S. D. S. (1940). *Indian Med. Gaz.*, **75**, 676.

GREVAL, S. D. S., CHANDRA, S. N., and DAS, B. C. (1939). *Indian J. Med. Res.*, **27**, 589.

Idem (1940). *Ibid.*, **28**, 257.

GREVAL, S. D. S., DAS, B. C., and SEN GUPTA, P. C. (1938). *Ibid.*, **26**, 1161.

GREVAL, S. D. S., SEN GUPTA, P. C., and DAS, B. C. (1938). *Indian Med. Gaz.*, **73**, 585.

GREVAL, S. D. S., SEN GUPTA, P. C., and NAPIER, L. E. (1939). *Indian J. Med. Res.*, **27**, 181.

GREVAL, S. D. S., YESUDIAN, G., and CHOUDHURY, S. K. (1930). *Ibid.*, **17**, 1161.

HOVERSON, E. T., PETERSEN, W. R., and SACKETT, D. L. (1935). *J. Lab. and Clin. Med.*, **20**, 337.

IYENGAR, K. R. K. (1919). *Indian J. Med. Res.*, **7**, 398.

LLOYD, R. B., NAPIER, L. E., and MITRA, G. C. (1930). *Ibid.*, **17**, 957.

MEDICAL RESEARCH COMMITTEE, 1918. The Wassermann Test. *Med. Res. Council, Special Rep. Ser.* No. 14. His Majesty's Stationery Office, London.

SMITH, D. C. (1940) .. *Internat. Med. Digest*, **37**, 279.

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take the small quantity sufficient for wetting the soil but try to allow as much sullage as possible to run into the fields and thus convert each field into a sullage swamp, breeding *C. fatigans* in large numbers. It is, therefore, not surprising that many of the local inhabitants suffer from filariasis. Besides filariasis, malaria also exists here, as it does all along the coast-line from Berhampore to Balasore. This station, therefore, offers unique facilities for carrying out an experiment of this nature.

Ten contiguous ricefields along the *kutcha* main sullage outfall drain away from the railway malaria control limits were selected for this experiment, which was conducted throughout under the guidance of the malariologist and assistant malariologist of the B. N. Railway and under the supervision of a committee consisting of Mr. P. D. Dixit, M.SC., paddy specialist, Orissa, Dr. R. G. Panigrahi, M.B., B.S., D.P.H., malaria officer, Orissa, and the present author. The ricefields were consecutively numbered and fields 1, 3, 5, 7 and 9 were selected for stocking with sullage, while fields 2, 4, 6, 8 and 10 were selected as 'control' fields. Sullage was allowed into the former set of fields on the following dates :—

17-2-41	3-3-41	7-4-41	5-5-41
24-2-41	10-3-41	14-4-41	12-5-41
	17-3-41	21-4-41	17-5-41
	24-3-41	28-4-41	
	31-3-41		

As Mr. Dixit, one of the members of the committee, suggested that the composition of the sullage was likely to vary from time to time in the same day and that the stocking should be done always between 8 a.m. and 10 a.m., when the 'concentration' is at his highest, any fields which could not be 'treated' with sullage during that time on the above dates were so 'treated' on the next day.

The depth of sullage allowed in each field was not less than ½ inch or more than one inch. On 24th March and 31st March, 1941, however, sullage was allowed to a depth of ¼ inch only as less sullage was available, due to its diversion elsewhere by engineers while converting part of the *kutcha* drain into a *pucca* one.

The sullage flowing into the main outfall drain near the experimental fields was chemically examined in February and again in May, while the sullage stocking was in progress. The results of the chemical examination were as shown in table I*.

It was pointed out by the chemist who carried out the above examinations that there was a noticeable lack of nitrates in the sullage. The author, however, observed that crude 'untreated' sullage, which was not yet subjected to bacterial action, would contain complex nitrogenous organic matter, which would reduce itself into simpler nitrates, only after such action took place. In the present case, such action would take place in the soil after the sullage was

TABLE I

	24-2-41	28-5-41	
Solids in suspension ..	8.6	10.8	In 100,000 parts.
Free and saline ammonia	14.5	16.0	
Aluminoid ammonia ..	7.2	0.82	
Nitrates	*nil*	*nil*	
Nitrites	1	*nil*	
B.O.D. at 18°C. ..	4.5	1.0	
pH value	7.0	7.2	

allowed to soak into the soil and it was, therefore, suggested that the soils taken from one 'treated' and one 'control' field might be examined. This was done with the result shown in Table II.

TABLE II

Date	Soil from	Nitrates	
28-5-41	Field I 'treated'	0.68	In 100,000 parts.
28-5-41	Field II 'control'	0.12	

As neither the 'treated' nor the 'control' fields were given any manure throughout the dry season in which the sullage stocking took place, the higher amount of nitrates present in the 'treated' fields should be due solely to the addition of sullage to the fields.

All the 'treated' fields became dry 2 to 3 days after sullage was allowed into them. On a few occasions, however, the fields continued to be wet for 4 days during April and May, due to stray summer showers, which added rain water to the bulk of the sullage. Thus, the fields were invariably dry for a major part of the week and there was absolutely no chance for the successful breeding of *C. fatigans* in any of them.

Ploughing in the dry season is good agriculture as that would allow the soil to be 'aerated' and lead to a better crop. But all the *ryots* in the area do not plough the fields even once in the dry season, due to poverty or ignorance or both. Some do not plough because they should use sullage for wetting the soil beforehand and considerations of 'orthodoxy' prevent their touching sullage. The *ryots* of the ten experimental fields were encouraged to plough their respective plots at least once in the dry season but many of them could not be so induced. The dates on which such ploughing was done in the fields, if any, are shown in table III.

TABLE III

Field number	'Treated' or 'control'	Date or dates on which ploughing was done
I	'Treated'	24-2-41
III	"	24-2-41 and 3-3-41
IV	'Control'	3-3-41
VI	"	19-5-41

*The author is indebted to Mr. S. C. Mukherji, B.SC., Public Health Chemist, B. N. Railway, for the chemical examinations of sullage and soils.

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The effects of dry season ploughing will be discussed later in this paper.

As one of the main objects of these experiments is to ascertain the effect of sullage stocking on the rice crop, and as the *ryots* of different fields use different varieties of paddy on their respective fields, which would render comparison difficult, paddy 812 was purchased by the B. N. Railway from the Government Agricultural Farm at Cuttack and supplied free of charge to all the owners of the ten experimental fields, for sowing. This paddy was accordingly sown in all the fields about the middle of June, when the south-west monsoon set in. In this part of Orissa, the rice is 'broadcast' in the fields and not 'transplanted'. The broadcasting was done in an identical manner in all the fields.

All the fields were irrigated with rain water only, there being no seepages in any of them. In addition to rain water, surplus water from adjacent fields situated on a slightly higher level was occasionally led into these fields whenever necessity arose for partial drainage in those fields. About the middle of November, due to flood following heavy showers, field 2 was partially inundated, and field 9 'treated' and field 10 'control' were more or less completely damaged.

Larval samplings were made in all the ten fields from 1st July, 1941 to 30th November,

TABLE IV

Plot number	'Treated' or 'control'	Month	*A. barbirostris*	*A. hyrcanus*	*A. subpictus*	*A. vagus*	*A. culicifacies*	*A. aconitus*	*A. vernus*	*A. annularis*	*A. pallidus*	*A. tessellatus*
I	T	July ..	..	..	37	3	..	..	..	..	..	..
I	T	Aug. ..	..	..	115	11	2	..	..	..	..	..
I	T	Sept. ..	1	..	69	38	..	..	..	..	..	..
I	T	Oct. ..	..	15	50	34	..	..	..	1	..	..
I	T	Nov. ..	..	30	..	4	..	..	..	1	..	..
		TOTAL ..	1	45	271	90	2	..	..	2	..	..
III	T	July ..	..	..	84	5	..	..	..	..	..	..
III	T	Aug. ..	..	2	85	26	2	..	..	..	..	..
III	T	Sept. ..	..	1	62	25	1	..	..	..	..	..
III	T	Oct. ..	..	5	10	18	..	..	..	1	..	..
III	T	Nov. ..	..	19	..	1	..	..	..	1	..	..
		TOTAL ..	..	27	241	75	3	..	..	2	..	..
V	T	July ..	..	..	52	7	..	..	..	..	..	..
V	T	Aug. ..	..	2	46	8	1	..	..	..	..	..
V	T	Sept. ..	..	..	60	11	4	..	..	1	..	..
V	T	Oct. ..	..	8	4	14	..	..	..	1	..	..
V	T	Nov. ..	..	15	..	..	..	..	..	..	..	..
		TOTAL ..	..	25	162	40	5	..	..	2	..	..
VII	T	July ..	..	..	54	16	1	..	..	..	..	..
VII	T	Aug. ..	..	..	60	12	1	..	..	..	..	..
VII	T	Sept. ..	..	1	59	28	1	..	..	2	..	..
VII	T	Oct. ..	..	16	7	13	..	..	..	..	..	..
VII	T	Nov. ..	..	17	..	3	..	..	..	..	..	..
		TOTAL ..	..	34	180	72	3	..	..	2	..	..
IX	T	July ..	..	..	41	6	..	..	..	..	..	..
IX	T	Aug. ..	..	1	75	11	1	..	..	1	..	..
IX	T	Sept. ..	..	4	53	16	..	..	..	..	..	..
IX	T	Oct. ..	..	16	18	16	..	..	..	1	..	..
IX	T	Nov. ..	..	31	..	4	..	..	..	..	..	..
		TOTAL ..	..	52	187	53	1	..	..	2	..	..

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1941, by the same man throughout. To conform with the practice of the previous experiment, in each sampling, 25 ladle dips were made in each field once in every week. The dips were made mostly at the edges, as the *ryots* were unwilling to let us walk over the fields in search of larvæ in the centre of the fields, lest the plants should be damaged. It is emphasized that this is not a satisfactory method of larval estimation and it was adopted for want of better methods. However, almost all the paddy-field-breeding larvæ were found in these samplings, which indicates that the method adopted is not very defective.

The larvæ collected from each 'treated' field are shown in table IV.

The larvæ collected from each 'control' field are shown in table V.

The larval collections from all 'treated' fields are shown month by month in table VI, while the corresponding collections from all 'control' fields are shown in table VII.

It may be mentioned here that the larval collection made on the lst of October was spoiled in the laboratory before the larvæ could be identified. As a result of floods, no larval collection was possible on the 15th of November and there were no larvæ in any field on the 25th of November, as the water was drained away preparatory to the harvest. Thus, four collections were made in each of the first three months

TABLE V

Plot number	'Treated' or 'control'	Month	*A. barbirostris*	*A. hyrcanus*	*A. subpictus*	*A. vagus*	*A. culicifacies*	*A. aconitus*	*A. varuna*	*A. annularis*	*A. pallidus*	*A. tessellatus*
II	C	July ..	..	..	47	11	1	..	..	..	..	..
II	C	Aug. ..	..	..	101	20	9	..	..	16	1	..
II	C	Sept. ..	2	13	26	8	5	..	..	15	1	..
II	C	Oct. ..	1	18	7	16	..	7	..	18	..	..
II	C	Nov. ..	..	11	..	4	..	4	1	6	..	..
		TOTAL ..	3	42	181	59	15	11	1	55	2	..
IV	C	July ..	..	..	32	6	..	..	..	..	..	..
IV	C	Aug. ..	..	..	49	4	13	..	..	13	..	..
IV	C	Sept. ..	2	16	23	11	2	..	..	17	2	..
IV	C	Oct. ..	..	11	9	11	..	6	..	20	..	..
IV	C	Nov. ..	..	22	..	..	..	3	..	6	..	1
		TOTAL ..	2	49	113	32	15	9	..	56	2	1
VI	C	July ..	..	..	48	6	9	..	..	..	..	..
VI	C	Aug. ..	..	9	51	6	17	..	..	24	3	..
VI	C	Sept. ..	4	15	14	6	4	..	..	19	2	..
VI	C	Oct. ..	1	13	2	14	..	7	1	14	..	1
VI	C	Nov. ..	..	7	..	2	..	9	..	8	..	..
		TOTAL ..	5	44	115	34	30	16	1	65	5	1
VIII	C	July ..	..	..	50	1	4	..	..	..	..	..
VIII	C	Aug. ..	..	3	55	11	4	..	..	23	..	..
VIII	C	Sept. ..	2	17	37	4	6	..	..	22	1	..
VIII	C	Oct. ..	..	18	7	15	..	12	..	20	..	..
VIII	C	Nov. ..	..	18	4	5	..	5	1	5	..	..
		TOTAL ..	2	56	153	36	14	17	1	70	1	..
X	C	July ..	..	..	27	3	4	..	..	..	..	..
X	C	Aug. ..	..	4	36	6	10	..	..	18	1	..
X	C	Sept. ..	3	17	35	4	4	..	..	24	..	..
X	C	Oct. ..	..	13	5	10	..	13	1	19	..	1
X	C	Nov. ..	..	14	2	5	..	10	..	8	..	..
		TOTAL ..	3	48	105	28	18	23	1	69	1	1

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TABLE VI

'Treated' fields

Month	*A. barbirostris*	*A. hyrcanus*	*A. subpictus*	*A. vagus*	*A. culicifacies*	*A. aconitus*	*A. varuna*	*A. annularis*	*A. pallidus*	*A. tessellatus*
July ..	..	..	268	37	1	..	..	..	..	..
Aug. ..	..	5	381	68	7	..	..	1	..	..
Sept. ..	1	6	303	118	6	..	..	5	..	..
Oct. ..	..	60	89	95	..	..	..	4	..	..
Nov. ..	..	112	..	12	..	..	..	..	..	..
TOTAL ..	1	183	1,041	330	14	..	..	10	..	..

TABLE VII

'Control' fields

Month	*A. barbirostris*	*A. hyrcanus*	*A. subpictus*	*A. vagus*	*A. culicifacies*	*A. aconitus*	*A. varuna*	*A. annularis*	*A. pallidus*	*A. tessellatus*
July ..	..	..	204	27	18	..	..	..	..	..
Aug. ..	..	16	292	47	53	..	..	94	5	..
Sept. ..	13	78	135	33	21	..	..	97	6	..
Oct. ..	2	73	30	66	..	45	2	91	..	2
Nov. ..	..	72	6	16	..	31	2	33	..	1
TOTAL ..	15	239	667	189	92	76	4	315	11	3

(July, August and September), while only three collections were made in October and two in November.

The harvesting of the crop was made on the 2nd December, 1941, after giving due notice to the owners of the various fields and with their permission. Either the owners or their representatives were present at the harvest. The following officers were also present:—

Dr. A. K. Adhikari, M.B., F.R.S.T.M.&H., assistant malariologist, B. N. Railway.

Mr. P. D. Dixit, M.SC., paddy specialist, Orissa.

Dr. R. G. Panigrahi, M.B.B.S., D.P.H., malaria officer, Orissa.

In each of the ten fields, a plot measuring exactly 20 feet × 5 feet 6 inches and situated at least 5 feet from the side 'bunds' was selected and all plants standing within that plot were cut. The cut plants from each plot were made into a bundle to which a slip of paper containing the number of the field was attached. All the ten bundles were then brought to the thrashing floor specially prepared for the purpose, and the bundles representing the first eight fields were separately thrashed. As the fields 9 ('treated') and 10 ('control') were more or less completely damaged by flood, it was considered undesirable to thrash them and include their yields in this experiment, as it would tend to vitiate the results obtained. The paddy obtained from fields 1 to 8 was then weighed separately, with the results shown in table VIII.

TABLE VIII

'TREATED' FIELDS			'CONTROL' FIELDS		
Plot number	Paddy yield		Plot number	Paddy yield	
	Seers*	Chataks*		Seers*	Chataks*
I	4	2	II	3	15
III	4	11½	IV	4	..
V	4	7	VI	3	12
VII	4	5½	VIII	2	7½
TOTAL	17	10	TOTAL	14	2½

* Sixteen chataks make one seer and forty seers make one maund.

Discussion

It has been stated that, though the main object of this experiment is to ascertain the effect of sullage stocking of ricefields in the dry season on the anopheline breeding in the next rice-growing season, with special reference to the local vectors, there were incidentally three other objects in view, *viz.* (*a*) to indicate a method of sullage disposal suitable to rural areas, (*b*) to control *C. fatigans* (and with it filariasis) without the use of oil, and (*c*) to ascertain if this method would increase the rice crop in areas where the fields are not otherwise manured.

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As the sullage which is spread on ricefields is regulated so that not more than one inch of depth is obtained, and as that amount of sullage soaks completely into the soil in a maximum period of 4 days, it may be taken to be a suitable method of disposal in rural areas where no other satisfactory method is available or practicable. In any case, this is distinctly better than allowing sullage to accumulate in swamps. If the field is ploughed at least once in a month during the period of 'stocking', it might even become one of the approved methods. If the *ryots* notice the advantages of such ploughing (which are referred to below), there may be no further need to induce them to do so.

In this method, sullage irrigation is so regulated that the swamps are eliminated, rendering breeding of *C. fatigans* impossible. Control of *C. fatigans* and of filariasis would come well within the range of practical politics, which can be adapted to rural conditions with the minimum amount of supervision.

Regarding controlling malaria by this form of naturalistic measure, it may be said that this experiment has confirmed the previous findings as shown below:—

The first four species listed in tables VI and VII are not carriers. There is evidence to show that *A. culicifacies* is not a carrier in this area (Senior White, 1936; 1937). *A. aconitus* was found in the infective stage at Dhanmandal and Malatipatpur, 60 miles north and 22 miles south of Khurda Road respectively. *A. varuna* has so far been found to be a carrier in Jeypore Hills (Senior White, 1936; 1937), in the Central Provinces (Senior White and Adhikari, 1940), in Chota Nagpur (Senior White and Das, 1938 and Senior White and Appal Narayana 1940) and in Bengal (Iyengar, 1934 and Roy, 1938). *A. pallidus* does not appear to be of any importance as a vector at Khurda Road while *A. tessellatus* is definitely not a carrier. The main carrier of this area is *A. annularis,* which, with a low sporozoite rate of 0.08 per cent, is capable of creating and maintaining hyperendemic conditions by the sheer weight of its numbers (Senior White, Mss. and Sarathy, 1932).

Tables VII and VIII show that, in the 'treated' fields, there is a marked increase of non-carriers like *A. subpictus* and *A. vagus* and a very substantial and significant reduction in carriers like *A. annularis, A. aconitus* and *A. varuna.*

The observations of last year relating to *A. barbirostris* and *A. hyrcanus* are not borne out by this year's findings. During this experiment, one larva of *A. barbirostris* and 183 larvæ of *A. hyrcanus* were collected from the 'treated' fields as against 15 and 239 respectively from the 'control' fields. The inference that these two species prefer clean water (Rao, 1941) does not, therefore, hold good.

Table VIII shows that (*a*) the four 'treated' fields yielded 3 seers and 7½ chataks more paddy than the four 'control' fields, and that the lowest yield among the 'treated' fields is higher than highest yield among the 'control' fields, which is a significant fact. The increase in the yield of the 'treated' fields over that of a 'control' field is estimated to be over 8½ maunds per acre. It is significant that, among the 'treated' fields, that which was ploughed twice during the dry season, *viz,* field 3, yielded the highest crop, while one of the 'control' fields (field 4), which was once ploughed, yielded the best crop among such fields.

It can therefore be assumed that addition of crude sullage to ricefields in the dry season improves the crop to a considerable extent.

Summary

Allowing sullage into ricefields in the dry season once a week without converting them into sullage swamps has the following effects :—

(*a*) increasing the breeding of non-carrier species like *A. subpictus* and *A. vagus* and greatly decreasing the breeding of carriers like *A. annularis, A. aconitus* and *A. varuna;*

(*b*) disposing of sullage in a manner suitable to rural conditions;

(*c*) controlling *C. fatigans,* and with it filariasis, without the use of oil; and

(*d*) improving the rice crop to a considerable extent.

Acknowledgments

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REFERENCES

HACKETT, L. W., RUSSELL, P. F., SCHARFF, J. W., and SENIOR WHITE, R. (1938). *Bull. Health Organization, League of Nations,* **7,** 1016.

IYENGAR, M. O. T. (1934). *Rec. Malaria Survey, India,* **4,** 61.

RAO, V. V. (1941) .. *Indian Med. Gaz.,* **76,** 86.

ROY, D. N. (1938) .. *J. Malaria Inst. India,* **1,** 269.

RUSSELL, P. F., and RAO, H. R. (1940). *Ibid.,* **3,** 427.

SARATHY, M. K. P. (1932). *Indian Med. Gaz.,* **67,** 254.

SENIOR WHITE, R. (1936). *Rec. Malaria Survey, India,* **6,** 439.

Idem (1937). *Ibid.,* **7,** 47.

SENIOR WHITE, R., and ADHIKARI, A. K. (1940). *J. Malaria Inst. India,* **3,** 383.

SENIOR WHITE, R., and APPAL NARAYANA, P. (1940). *Ibid.,* **3,** 413.

SENIOR WHITE, R., and DAS, B. K. (1938). *Ibid.,* **1,** 169.

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A Mirror of Hospital Practice

CASE OF PITYRIASIS ROSEA SHOWING ENLARGEMENT OF THE SUPRA-TROCHLEAR LYMPHATIC GLANDS

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and

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D. B. (miner's son), aged 13 years, was seen on 27th September, 1941.

He had a pleomorphic rash resembling that of secondary syphilis, the face and hands being affected with the trunk, arms and legs, the ventral surface showing more than the dorsal. There was no sign of a primary chancre or any other lesion characteristic of secondary syphilis.

The supratrochlear lymph glands were palpable and hard and glands were palpable at the posterior triangle of the neck. The liver and spleen were not enlarged and there was nothing abnormal in the total or differential leucocyte count. Kahn's test was negative. The rash started growing bigger. After a few days the lesion started to scale and within a short time the typical collarette was seen. The scales did not show any organisms.

The patient was given the following ointment: Chrysarobin gr. v, Whitfield's ointment ad ℥ss, and in about two weeks' time the rash disappeared.

The lymphatic glands also diminished in size and finally could not be palpated easily.

Another case in a fair-skinned person was seen by one of us with the same result. Only in this case the age was 25 years. Here too the lymphatic glands were enlarged and disappeared with the rash. The Kahn's test was negative.

In the book descriptions of pityriasis rosea we do not find any mention of the lymphatic glands, but these two cases seem to show that the lymphatic glands are affected in some way.

CLINICAL NOTES ON SIX CASES OF PNEUMONIA TREATED IN TIBET AT ALTITUDES VARYING FROM 9,000 TO 13,000 FEET, WITH M.&B. 693

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PNEUMONIA is a serious disease even at sea level, but at high altitudes the danger is greater as the circulatory and respiratory systems are already working at some disadvantage.

A 10-horse-power engine working at a height of 11,000 feet develops only 5 to 6 h.p. Similarly the heart and lungs have to work harder to maintain equilibrium at a height.

Owing to the extreme cold, fatigue and exposure in Tibet, especially while travelling in winter, pneumonia is of more frequent occurrence than in the plains of India. This series of six cases includes one Tibetan, two Europeans, and three Indians.

Case 1.—A previously healthy Tibetan woman, aged 25 years. She was seen in Lhasa (11,000 feet) on the fourth day of her illness, in February 1940. No history of exposure to cold. She had been treated by a Lama but was getting no better, so it was decided to call the European doctor. Her sister had died the year previously from a similar complaint, Lama treatment having failed. On arrival at the house drums were beating and Lamas were chanting prayers outside the sick-room. The first procedure on any visit in Lhasa, professional or otherwise, is that the guest partake of tea and biscuits, usually in the shrine-room. The patient, puffing and blowing, made her appearance at another table and it was with some difficulty that she was persuaded to go back to bed immediately.

Examination.—Patient obviously very ill and cyanosed, with sordes.

Temperature 102.5°F., pulse 120, and respiration 34 per minute. The patient's chest was covered with stamp-marks, put on by the Lama doctor; especially over the right base where she had pain on coughing. There was diminished movement of the right base with early signs of consolidation. The sputum was viscid and purulent with an occasional rusty patch.

Diagnosis.—Right lobar pneumonia. M.&B. 693 was administered and the patient made an uneventful recovery.

Case 2.—A European, aged 41, resident in Lhasa for four years. He had been in the army previously with no history of illness other than scarlet fever and malaria. He had smoked and inhaled 50 to 60 cigarettes daily for many years. He was also overweight and six months previous to his illness had taken a proprietary drug to try to reduce. It was at this time that he developed precordial pain after exertion; but on examination of the heart nothing abnormal was discovered. He stopped taking the medicine and the pains ceased.

The patient was first seen on the third day of the illness, the history being that he had ridden twenty-eight miles in one day, mid-winter January 1941. On arrival home he felt 'out-of-sorts' and went to bed. He vomited once, and next day was able to sit in a chair.

Examination.—The patient did not look seriously ill.

Temperature 99.2°F., pulse 120, and respiration 28 per minute. The high pulse rate suggested that something was radically wrong. On account of the previous history of precordial pain and distress on exertion, it was thought to be a case of heart failure. There was no swelling of the feet, no albumin in the urine and there were no definite signs of heart or lung involvement. There was nothing abnormal discovered about the abdomen. The condition of the patient steadily deteriorated. On the fifth day he brought up a small amount of blood-stained sputum. There was a pronounced cough and he complained of pain at the right base posteriorly and over the precordial area.

Temperature 99.8°F., pulse 120, and respiration 32. Mouth dry; tongue furred; naso-pharynx ulcerated with pus present; heart normal; lungs diminished breath sounds at the right base; percussion note not markedly diminished.

Diagnosis.—Right lobar pneumonia. M.&B. 693 was commenced and continuous oxygen inhalations were administered. On the seventh day the patient's condition was critical. The temperature rose to 101.4°F., pulse 120, and respiration 40. There were now definite signs of consolidation at the right base. The treatment was continued. The patient had a crisis that night. Next morning his condition was as follows:—

Temperature 98.4°F., pulse 120, and respiration 28. M.&B. was stopped on the ninth day as the patient was experiencing severe nausea.

Tenth day.—Patient's temperature rose to 100.6°F. in the evening with a pulse rate of 112 and respirations 32. There was pain in the right axilla and in the right nipple region with dullness. M.&B. was recommenced.

The right base remained dull to percussion and there was no air entry. The patient refused needling. However, as the temperature remained raised, with raised pulse and respiration rates, a diagnosis of empyema or delayed resolution of the lung was made.

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M.&B. was continued at a dosage of 6 to 8 tablets per day when there was fever.

Subsequent course of the illness.—Ten weeks after the beginning of the illness the patient was able to get out of bed. His temperature and rate of respiration had settled to normal, but his pulse rate was still in the vicinity of 100; he had lost 56 pounds in weight. He gradually gained weight and was able to get about with the aid of crutches.

A total of 98 tablets of M.&B. (each 0.5 gm.) had been given, *i.e.*, 49 gm.

Seven months after this illness the patient was still unfit. He complained of breathlessness with cough and pain in the chest. He was advised to proceed to India for *x*-ray of chest, further investigation and treatment.

In India.—*X*-ray of his chest revealed a shadow behind and to the right of the sternum. It was uncertain whether it was an aneurysm of the ascending aorta (his Wassermann reaction was negative), or a neoplasm, and, to ascertain what the condition was, a course of deep *x*-ray therapy was given. The case is still under observation.

Case 3.—A European, aged 29 years, a non-smoker and a total abstainer.

History.—Five days ago, he was exposed to cold winds and snowy weather while travelling at an altitude of 14,000 to 15,000 feet. Two days ago he felt 'out of sorts' with a cough and cold in the head, but continued to travel. One day ago he vomited his breakfast, and, though not feeling well, managed to travel to Gyantse (13,000 feet), where he went to bed. He was first seen the next afternoon, *i.e.*, on the third day of the illness.

Examination.—Patient looked ill and had a hacking cough. His face was flushed, mucous membranes blue, and throat congested.

Temperature 102.8°F., pulse 110, and respiration 24.

Heart.—Nothing abnormal.

Lungs.—Emphysematous, slight dullness over the right base, with diminished air entry.

Sputum.—Small amount and blood-stained.

Abdomen.—Nothing abnormal.

Diagnosis.—Early lobar pneumonia.

Treatment.—M.&B. 4 tablets at 4 p.m., and repeated at 8 p.m. Morphia ¼ gr. at bedtime.

He slept fairly well that night and the next day his condition had improved. Temperature 99°F., pulse 96, and respiration 21. M.&B. was reduced to 2 tablets twice daily.

On the third day after commencing the M.&B. his temperature touched normal, and on the fifth day he was able to get up. A total of 8.5 gm. of M.&B. was given and he made an uneventful recovery.

Case 4.—A sepoy, aged 40, at Gyantse in March 1941. There was no history of previous illness or of exposure to cold. He complained of fever with rigors, and stated that he had vomited twice before admission to hospital.

Examination.—Patient did not look markedly ill, tongue furred, mucous membranes somewhat cyanosed. He had a slight cough and was bringing up muco-purulent sputum with streaky blood-stained patches, not typically rusty. His throat was congested. Temperature 99.2°F., pulse 84, and respiration 24.

Heart.—Normal.

Lungs.—A few crepitations were heard at both bases but more marked on the right. No dullness.

This case was thought to be a very early pneumonia, seen on the first day of the disease, and M.&B. was given straightaway.

The temperature had settled on the third day, but the respiration rate remained raised until the sixth day when the patient was allowed up. He still had a cough and a small amount of sputum, but otherwise made an uneventful recovery.

Case 5.—A sepoy, aged 38. He gave a history of having had a cough for two days and fever of 12 hours' duration.

Examination.—Patient looked ill, breathing rapidly and coughing.

Temperature 100.2°F., pulse 96, and respiration 30.

Heart.—Normal.

Lungs.—Movements equal. The percussion note was diminished at both bases. Vocal fremitus was increased at the left base. Air entry was poor and the breath sounds weak at both bases with moist râles. Sputum purulent but not blood-stained.

Treatment.—Fourteen tablets of M.&B. were given over 3 days, and the patient was able to get up on the fifth day.

Case 6.—A sweeper, aged 19, at Yatung, Tibet (9,000 feet), in September 1941.

The patient accompanied a party from India and came up inadequately clad in a cotton *dhoti* and a thin cotton coat. He first felt ill 4 days previously with cough, fever and vomiting. Next day, the party, with the sweeper, crossed the Jelap La Pass (15,500 feet), and ran into a cold wind and sleet.

The patient was first seen after having been ill 4 days with cough and continuous fever.

Examination.—Patient looked ill and cyanosed; tongue and lips dry, grunting respiration, throat congested.

Temperature 101°F., pulse 140, and respiration 40.

Heart.—Normal.

Lungs.—Slight dullness on percussion over the right base; air entry diminished; no adventitious sounds detected.

Abdomen.—Spleen enlarged to a width of three fingers below the costal margin.

Diagnosis.—Right lobar pneumonia.

Treatment.—M.&B. was commenced at once, and a total of 19 gm. was given in 6 days.

Course.—The temperature settled on the fourth day of treatment, *i.e.*, on the eighth day of the disease. On the eleventh day after treatment was commenced the patient left for India, and was fit enough to do the journey across the Nathu La Pass (14,300 feet).

Summary

1. These six cases of pneumonia diagnosed clinically were treated successfully with M.&B. 693 at these high altitudes. Oxygen was administered in one case only.

2. The second case is of interest on account of the difficulty in early diagnosis, the prolonged course of M.&B. given, and the subsequent *x*-ray findings in India where the right base showed no signs of disease.

3. Cases 4 and 5 occurred in sepoys and were seen within 24 hours of the onset of the disease. There were few signs of pneumonia and no consolidation, but M.&B. was given early in small doses with very favourable results.

4. Early diagnosis and treatment cut short the course of the illness and only small doses of M.&B. are required. Cases seen and diagnosed after the fourth day of illness are much more severe, and consequently necessitate the administration of larger doses of M.&B.

INTERCOSTAL HERPES ZOSTER TREATED WITH DIPHTHERIA ANTI-TOXIC SERUM

By S. K. SARKAR, M.B., B.S.

Assistant Surgeon, B. N. Railway, Dongargarh (C. P.)

History.—A railway guard noticed one or two vesicles which he described as blisters and a hyperæmic zone near the linea alba over the epigastrium. There

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was no subjective symptom at this stage. Next day there were more vesicles and an increasing red zone along 8th and 9th intercostal nerves on the right side, extending up to the axillary border. This day there was a feeling of discomfort but he did not worry much, thinking it to be 'spider lick', and he carried on his work. Next day the vesicles and the surrounding hyperæmic area reached the spine and the entire area became so sensitive that he had to discard clothing and report sick. He was slightly feverish. There was just a slight burning sensation at this stage which later increased to agonizing proportions giving him no rest for the next 4 days and nights. He ran a slight temperature (99 to 100°F.) during this period. A few vesicles ruptured accidentally, the patient experiencing great pain. He became so worried with this experience that he sat up day and night so that the vesicles might not get ruptured.

Treatment.—Treatment started on the third day of sickness. Dusting powder (zinc oxide, starch and camphor) to dust over the area and A.P. powder (aspirin, phenacetin) and a plain fever mixture were ordered.

Next day a typical picture of herpes zoster presented itself. Dusting powder, A.P. powders and fever mixtures were given and pituitrin 1 c.cm. was injected.

Fifth day.—The same powders, fever mixtures and pituitrin 1 c.cm.; again no relief.

Dusting powder was substituted by *chameli* oil with camphor in it by the patient. He tolerated this oil better than dusting powder.

Sixth day.—Same treatment. No relief.

Morphine gr. ¼ and atropine gr. 1/100. Injection given which gave relief for the night.

Seventh day.—He felt quite well up to 9 a.m. in the morning but the distress returned afterwards and he was the same again in the afternoon. At 5 p.m. I gave him a subcutaneous injection of 5,000 units of diphtheria anti-toxin.

Eighth day.—I saw him in the morning. He was completely relieved. Relief of burning sensation started at about 9 p.m. and by the early hours of the morning the agonizing sensation had entirely left. The burning sensation completely disappeared though some areas over the affected region remained hypersensitive for another three weeks.

Conclusion.—The course of this case suggests that diphtheria anti-toxic serum was responsible for the gratifying result. In the *Medical Annual*, 1939, Sir Stewart Duke-Elders mentioned this treatment for intractable herpes ophthalmicus, so I tried it in this case.

My thanks are due to my chief for permission to publish this note.

B. COLI INFECTION SUCCESSFULLY TREATED WITH M.&B. 693

By S. K. SARKAR, M.B., B.S.

Assistant Surgeon, B. N. Railway, Dongargarh

On the 3rd day of her confinement, a woman was attacked with fever (103.6°F.) with severe ague. A blood slide for malaria parasites was taken and quinine and alkaline mixtures were given. Next morning she felt better and the temperature came down to 100°F. The same night the high temperature (104°F.) returned with ague. Oral quinine and alkaline mixtures were given for three days without any improvement in the condition. As the oral quinine was having no effect, 2 quinine injections were given at a 12-hour interval (injection of gr. x in 2 c.cm. each time) but still without any impression on the temperature which continued high (102°F. to 104°F.). Chilly sensation was always present. The pulse rate was persistently high (ranging from 150 to 160). Toxæmia was moderate. Treatment with quinine was stopped. Blood and urine were collected for cultural diagnosis and sent to the railway laboratory at Khargpur. Sulphanilamide tablets and alkaline mixtures were started at the same time. Sulphanilamide tablets were given according to this dosage scheme (0.5 gm. tablets):—

	Total
1st day—2 tabs. every 4 hours (4 times a day)	8 tabs.
2nd day—Same dosage	8 „
3rd day—2 tabs. every 4 hours, *t.d.s.* ..	6 „
4th day—1 tab. every 4 hours (4 times a day)	4 „
5th day—Same dosage	4 „

Patient's condition remained the same with high temperature, high pulse rate and severe toxæmia. Sulphanilamide tablets were now replaced by M.&B. 693 tablets according to the following dosage:—

	Total
1st day—2 tabs. every 4 hours (4 times a day)	8 tabs.
2nd day—Same dosage	8 „
3rd day—2 tabs. every 4 hours (3 times a day)	6 „
4th day—Same dosage	6 „
5th day—1 tab. every 4 hours (4 times a day)	4 „
6th day—Same dosage	4 „
7th day—1 tab. every 4 hours, *t.d.s.* ..	3 „
8th day—Same dosage	3 „

From the 3rd day of M.&B. therapy, a change for the better was noticeable. Patient felt more comfortable and temperature was lower (99.4° to 101°F.). Pulse rate was still high (110 per minute). The temperature thereafter gradually came down to normal and the patient felt better, though the pulse rate persisted between 100 and 110 for about a month after the temperature and other conditions subsided.

But for a quinine abscess which developed during convalescence and was opened, she made an uninterrupted recovery. I thought that the pus might contain *B. coli*, the organism grown in blood culture, but culture of pus showed *Staphylococcus aureus*.

Below are the results of various examinations done in this connection by the pathologist at Kharagpur:—

Blood slide for malarial parasites.	None seen.
Blood culture ..	*B. coli.*
Urine culture ..	*B. alkaligenes* (due to contamination) urinary symptoms were absent. Routine examination showed albumin (traces) which was probably due to high fever.

No malarial parasites were seen at any time. Differential count on different days of sulphanilamide and M.&B. administration.

	Total leucocytes	Polymorphonuclears, per cent	Lymphocytes, per cent
Before treatment.	20,000	96	4
7th day of treatment.	30,000	91	9
12th day of treatment.	15,000	75	24

Culture of pus from abscess—*Staphylococcus aureus.*

My thanks are due to Dr. M. N. Sen Gupta, the railway pathologist, for doing the various examinations.

I am grateful to my chief for permission to publish this note.

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Indian Medical Gazette

APRIL

TRICHINELLIASIS

ELSEWHERE in this number is a recording of *Trichinella spiralis* in a cat in Calcutta. After searching through the *Indian Medical Gazette* from volume I, published in 1865, to the present time we can find no reference to this worm as a parasite of man in India. Baylis in volume II of the 'Nematoda', *Fauna of British India* series published in 1939, gives no definite records of the presence of this worm in the country, but he says it appears to have occurred formerly in man in India, but that no recent references to it have been found in the literature. 'Recent' is an indefinite word but we venture to suggest that, if it were known in man in India, it is surprising that no reference to trichinella has appeared in India's principal medical journal throughout its regular monthly publication for the last seventy-six years.

The distribution of this worm is a wide one; it is therefore strange that it has not been definitely recorded in India before and one feels that Baylis, although he gives no authority, is probably correct in saying that it has been found in India, but if we accept this it is even more strange that it has not been found in the last three-quarters of a century, a period that has been marked by enormous progress in our knowledge of parasites and in the application of many improved methods for discovering them. The explanation of this apparent failure to note the worm is clearly not to be found in the general adoption of better methods of prevention, because worm infections are still rife in this country in spite of the enormous amount of work that has been done on the question of control of those species whose presence is well known, and in the case of this unrecognized parasite, against which no special precautions have been taken, the chances of its eradication or reduction would be much more remote.

The finding of trichinella in a single cat is not a direct menace to man, but it is of importance as it is the first authentic evidence that the worm exists in India, and accordingly its presence in man may be eventually established. It appears to be able to exist in any carnivorous animal and transmission from animal to animal is direct and simple; muscle (meat) containing encysted larvæ is swallowed, the larvæ escape from their cysts by digestion of the wall; they develop into adults in the small intestine, and the females invade the gut wall and produce larvæ which pass all over the body in the circulation and come to rest in muscles, where they encyst, to await the chance of being eaten by another animal and thus continue their cycle. This absence of host specificity indicates the practical impossibility of eradicating the parasite from any country because the complete cycle can go on continuously in the lower animals (cats, dogs, rats, pigs, etc.) and it only reaches man by way of pork which is the only meat from flesh-eating mammals eaten by him, except that certain primitive races eat cats, dogs and any other small mammals they can capture.

The restriction to the possibility of human infection to eating pork is a natural preventive to the large proportion of the inhabitants of India who will not eat pork, but this caste rule is not a sufficient bar to the propagation of worm infection to explain the absence or at best the extreme rarity of trichinelliasis. This is clear from the fact that *Tænia solium* occurs in India and is probably very much commoner than the records of its occurrence indicate; this worm, also acquired only by the eating of pork, depends on man for the continuance of its cycle, so it should be easy to eradicate in comparison with *Trichinella spiralis* which can continue its existence in many other animals without the intervention of man.

The history of trichinelliasis is interesting to us and we give below a brief outline as it shows that recognition of the disease and the adoption of the most strenuous measures possible in countries with highly developed public health services has not resulted in its disappearance, so that if this worm became firmly established in India it would probably present a serious problem.

The worm was first found in the encysted larval stage at post-mortem examinations in England in 1828; this observation was repeated several times in the next six or seven years and was soon followed by similar reports from Germany, Denmark and North America. The first record in pigs was in America in 1846, and the life history was worked out, partly by Leuckart and partly by Virchow, from 1855 to 1859, and in the following year Zenker showed that trichinelliasis could be a serious disease. The detailed work was done in Germany and the result was that the Germans made strenuous efforts to control the disease but only with partial success, because it is still prevalent there. Although not often seen in England, trichinelliasis smoulders there; only last year several cases were reported from a focus near Wolverhampton, and in the *British Medical Journal* of 27th December last there is an account of another outbreak in Birmingham in which 78 cases were reported. For the past fifty years the problem has received constant attention in the United States of America and numerous tables of statistics from the results of *post-mortem* examinations for this worm have been published; these have been amplified by specific dermal and precipitin reactions on living persons in recent years. These reports come from all over the Union and on the whole the condition

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appears to be more severe in the northern than in the southern states.

Trichinelliasis is now known to be present in many other European countries than the original Germany and Denmark, it is present but not common in parts of Africa and South America, but it does not appear to have been found anywhere in Asia (with the doubtful exception of India), the Pacific Islands or Australia. In this distribution there is a suggestion that it is commoner in the temperate zones than in the tropics.

The symptoms of this disease are not in any way characteristic and they vary in intensity directly with the number of larvæ in the body. It is accepted by those with the most extensive experience that the majority of cases are so mild as to pass unnoticed, or if they are a little more severe they are usually diagnosed as influenza or one of the other short acute fevers, and the most severe infections present the symptoms of one of the exanthemata or of enteric fever, and it is only if the cause is suspected that a correct diagnosis is made; even then it is a matter of considerable difficulty. The search for larvæ at *post-mortem* examinations also requires special examination of the muscles, particularly the diaphragm, either by direct microscopic examination of 'press preparations' or by peptic digestion and extraction of the freed larvæ.

From these remarks it is abundantly clear that trichinelliasis may be present for years in a country without its presence being suspected. This applies with particular emphasis to India because a large part of the rural population is far out of touch with medical aid, so that except for the commonest diseases little is known about the causes of their morbidity and mortality, and it is particularly applicable to diseases acquired from pigs because isolated primitive communities are among the chief pig breeders in this country.

Man can become infected only by eating raw or insufficiently cooked pork that harbours the larvæ, so at first sight it appears that it would be a simple matter to eradicate the disease, but in practice this has not been found possible, even in such a highly developed country as the United States. The reason for this is that a much more detailed examination of the carcasses is needed to discover light infections than is possible, when the cost in the time of highly skilled inspectors and the amount of damage that the meat must be subjected to is set in the balance against the value of finding every lightly infected pig carcass. A much more effective method has been found in enforcing that all pigs should be fed with only thoroughly cooked food, thus obviating completely the chance of infection.

It is not meant to indicate by this editorial that trichinelliasis is at present an urgent problem in India, nor is it one that is likely to become urgent in the near future, but the discovery of the larvæ in an animal here suggests the possibility of *T. spiralis* being found in human beings as well and this should be borne in mind, because in many of the reported outbreaks the first one or two cases have been quickly followed by a number of severe infections with a mortality as high as 30 per cent, and it is only after the cause has been recognized and care in the consumption of pork advised or enforced that such an epidemic has been brought under control.

P. A. M.

Special Articles

ALCOHOLIC BEVERAGES IN INDIA

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PART I

THE use of intoxicating drinks, or beverages, by man dates from time immemorial. Modern researches have established that the ancient Babylonians prepared alcoholic beverages from different kinds of cereals as early as 4,000 B.C. The ancient Egyptians and the Babylonian bakers and brewers prepared bread and beer from barley. In Egypt the use of beverages, made from cereals, was fairly common and was intimately connected with the sacrificial rites practised in those days. The Egyptians taught the art of brewing to the Jews and the Greeks, and the latter transmitted their knowledge to the Romans. There is evidence to show that the Romans made ample use of this knowledge, as beer was served as a ration to the armies in the time of Julius Caesar. The beers of early days were flavoured with wormseed, ground-ivy, pine, willow-bark, etc.; hops came into use very much later.

The scientific study of alcoholism dates from the middle of 19th century A.D. The chief sources of our information regarding earlier times are the writings of poets, especially the gnomic writers, such as theologists, satirists, including Horace, Juvenal, Martial, Luchan and the Greek anthology philosophers, such as Plato, Plutas and Seneca, and above all the two encyclopædic writers, Pliny the elder and Athenaeus. Pliny (A.D. 23–79) consistently decried the luxury and corruption of the age; Athenaeus, who flourished at the

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end of the second and the beginning of the third century A.D., is of special interest to the medical reader. Aristotle and his disciples, Theophrastus and Chameleon of Heraclea, frequently refer to the use of alcoholic drinks at banquets among the Greeks and Romans, as a sign of barbarism. Both in Greece and Italy, festivals connected with the god of wine served as an excuse for widespread intoxication. Such festivals were subsequently banned by the Roman State. Iberians, Celts and Macedonians were also notorious for drunkenness.

The English word alcohol is of semitic origin, 'Al' and 'Kohl' meaning a fine black powder—the name originally given to the sulphide of antimony, which was obtained by sublimating galena. This powder was used by women as a cosmetic for the eyebrows. Later the distillate of wine was given the name alcohol. In Spain the word 'alcohol' still means either a pigment or a drink. In the Hebrew Bible there is a reference to drunkenness of Noah in the book of Genesis. This reference is believed to be as old as 4,000 B.C.

Though there is some evidence of the existence of a certain amount of individual chronic alcoholism, as mentioned by Pliny and Seneca in classical antiquity, it was mainly of a convival character, and was limited only to alcoholism associated with prostitution. It differed from that of the present-day alcoholism in the fact that it was more common among the upper classes. There was no legislative control and no distilled liquors were used. The latter were introduced only in the 15th century A.D.

In India the earliest reference to the use of alcoholic drinks is traceable to 2,000 B.C. The ancient Aryan invaders of India, who appear to have been well versed in the art of brewing, used a beverage called *soma*. The exact nature of the *soma* of the Vedic period is still wrapped in mystery and the juice of about a dozen different plants has been regarded as the *soma* of Sanskrit literature. Hemp and ephedra figure in this list. According to Professor Max Muller *soma* was probably a kind of fermented liquor. The *soma* or *homa* plant (*Sarcostemma*) was imported into India by the Mongolian Tartar races. When properly squeezed, it yields a juice, which after fermentation and mixing with honey produces an exhilarating and intoxicating drink. Three kinds of drinks were known in the time of Manu, *viz, gouri* prepared from molasses, *madur* from the sweet flowers of *Bassia latifolia* and *paishti* from rice and barley cakes. Of these, *paishti* was reckoned as the most common. The *suras* were included under the generic term *madya*, which included every kind of alcoholic drink. *Jagla*, a kind of rice beer, is mentioned in 'Susruta'—a Sanskrit medical treatise written in the 5th century A.D. *Khola*, another beverage, mentioned in the later editions of the same treatise, was prepared from powdered barley. It is probable that the English *alcohol* and the Arabic *alcohol* have the same origin as *khola*. It would appear, therefore, that the art of fermenting starchy and saccharoid substances was understood and practised in India from very early times. In all probability the aboriginal races of India learnt the art of brewing from the Aryan invaders, since from immemorial times they have been preparing and using such beverages.

Certain drinks and beverages commonly used in many parts of the Himalayas appear to be similar to those commonly used by the Mongolian races. Some of these preparations resemble *shamshu* and *saké* used in China and Japan. The reason for this is not far to seek. The Mongolian stock invaded India from the north-east by degrees, and the evidence of this invasion still exists in the Mongolian characteristics of the Himalayan races at the present day.

Apart from the use of alcohol as an intoxicant the ancients seem also to have put it to, what one would call, its legitimate or medicinal use. The word 'whisky' is derived from *usquebaugh* (Gaelic) which means water of life. The nectar of Indian deities referred to as *soma* is also alleged to have been an alcoholic drink by some authorities. Finally, alcohol is believed to have been the first hypnotic and anæsthetic used by man for relieving pain, while spirits are still used in many places as a universal remedy for practically all diseases.

Classification of the alcoholic beverages used in India

The excise law has adopted a somewhat artificial distinction between the alcoholic drinks used in this country, *viz,* country liquor and foreign liquor.

Country liquors.—These are the plain spirits made from approved bases and taxed at the local excise rate; they also include the fermented liquors prepared according to indigenous processes.

Foreign liquors include all imported liquors and those manufactured in India in imitation of the imported liquors. These are taxed at a tariff rate. They also include spirits made from materials other than those recognized as bases for country spirits and all other kinds of sophisticated and flavoured spirits made from special bases. Thus all the spirits manufactured in India even after the European method, when plain, are classed as country spirits, but when they are sophisticated, they are classed as foreign liquor.

The alcoholic beverages can best be divided into fermented and distilled liquors.

Fermented liquor.—The fermented liquors that are used in this country can be further divided into two groups:—

(*a*) Natural products such as 'toddy' which include the juices of various kinds of palm trees.

(*b*) The locally manufactured drinks which are produced by fermenting different bases such as rice, millet, toddy, etc.

Distilled liquor.—The manufacture of country spirit in India is allowed from a few specified bases only. The ideal materials for fermentation are malt, barley and sugar which can be obtained from various sources. Starches are freely used for commercial and economic reasons. The more frequent substitutes are rice, potato, tubers, sugarcane, mahua flowers and cashew fruit.

(*i*) *Spirits made from sugars.*—For the manufacture of alcohol, sugars are used chiefly in Northern India, particularly in the Punjab, the N.-W. Frontier Province and Sind. The common sugars used for this purpose are the cane juice or *ras*, refuse of crushed sugarcane 'megass' which is termed *pata*, the raw sugar known as *jaggri* or *jaggery*, also *gur, rab, i.e.* the semi-solid *gur*, molasses and treacle.

(*ii*) *Mahua spirits.*—*Mahua*, also known as *mohwa* or *mohwra* (*Bassia latifolia*), is the next commonest base employed for the manufacture of country spirit in India. The *mahua* grows wild in Central India, western districts of Bengal, the United Provinces, Gujarat, Kanara and Assam. The plant is capable of growing at altitudes up to 4,000 feet above sea level, and is often cultivated for its flowers. The flowers are rich in sugar and are collected in the months of February to May. A tree yields approximately 160. to 230 lb. of flowers, which are dried in the sun till they turn reddish brown and give out a peculiar mousy odour. When kept for some time, they change to black and become moist as partial fermentation sets in of itself during storage.

(*iii*) *Rice spirits.*—Rice spirit was at one time a popular drink in Bengal. The use of rice for the manufacture of spirit is at present discouraged as it involves a considerable wastage of food material.

(*iv*) *Toddy spirits.*—Toddy is sometimes used for distilling spirit in Bombay and Madras presidencies.

(*v*) *Fruit spirits.*—Fruits such as raisins, dates and apples were used in the past in Sindh and Kashmir; at

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present, however, they are rarely employed for this purpose.

(*vi*) *Cashew spirits.*—In South India, especially in South Kanara, spirits are sometimes distilled from cashew fruit (*Anacardium occidentale*), which is popularly believed to have diuretic and diaphoretic properties. It is also said to possess analgesic effects when applied externally to inflamed joints, as it contains small proportions of the active principles of the cashew, *viz,* cardol which has irritant properties and anacardic acid, which is an active compound. Because of the presence of these substances, its use should be discouraged.

(*vii*) *Spirits from cereals.*—Cereals, such as wheat, rye, barley and oats, are also used for brewing and distillation.

(*viii*) *Spirits from uncommon ingredients and adulterants.*—Besides the above recognized bases other substances are sometimes added to the fermenting mass to enhance its effects, the most common being *datura* or Indian hemp; strychnine or nux-vomica seeds, opium or poppy capsules, aconite, colocynth (bitter apple or *thu*), *Terminalia balarica* or *bhaira* or *sagona, Terminalia chebula* fruits or *harrahilika, Sorghum vulgare* or *joar* root, *gomyin* (seeds of *Entada scandens* and tobacco). This practice is dangerous and has sometimes led to fatal results.

Chemistry of alcoholic fermentation and distillation.—Carbohydrates, such as starch, which form the main constituents of cereals, must be converted into sugar through the process of saccharification or conversion, before they can directly ferment by the action of yeast. This is brought about by the presence of the ferment in the yeast and also by the action of acids under artificially increased pressure and heat. When starch is boiled with dilute acids, water is taken up and it splits into dextrose and dextrin. The rice starch can also be converted into sugar by certain moulds which grow naturally on damp rice. Sometimes these moulds are collected and used in the same manner as brewer's yeast.

Canesugar requires first to be changed into a mixture of fermentable sugars such as dextrose and lævulose. The mixture of dextrose and lævulose, resulting from inversion, is an uncrystallizable syrup; it is even sweeter than canesugar and is called invert sugar or commercially 'invert'. Inversion is affected either through a substance in the yeast called 'invertain', or through the action of dilute acids such as hydrochloric or sulphuric acid. Inversion may take place at ordinary temperature, but it is aided and accelerated by heat.

Fusel oils.—When alcoholic fermentation occurs 95 per cent of the sugars are converted into ethyl alcohol. Five per cent are converted into other substances, namely, organic acids, higher alcohols, particularly propyl, butyl, and amyl alcohols and aldehydes and esters. These substances are present in ordinary wines and beers in minute quantities but pass in higher concentrations in pot-still spirit. The volatile substances with higher boiling point than ethyl alcohol are collectively known as *fusel oil* which in freshly distilled spirit impart a nasty taste, but which on storage for years undergo chemical changes and impart to the spirits special flavours. Pot-still whisky contains 0.3 per cent of fusel oil, but with patent stills only 0.03 is left. The higher alcohols are important constituents of fusel oil, amyl alcohol occurring in larger quantities and propyl and butyl in smaller quantities. The higher alcohols are more toxic than ethyl alcohol. Raw spirits produce very deleterious effects and carelessly distilled spirits are extremely toxic. Very little, however, is known regarding the action of constituents of alcoholic beverages other than ethyl alcohol.

Methyl alcohol contained in wood spirits to the extent of 5 to 10 per cent behaves differently from ethyl alcohol inasmuch as it is very slowly oxidized by the tissues. The drinking of wood spirit and methylated spirit is an important cause of poisoning in man on account of the methyl alcohol present in it, the chief symptoms produced are coma lasting for some days, bilateral inflammation of the optic nerves and retina leading to total blindness.

Manufacture of country spirits.—The following five agents are necessary for producing alcoholic fermentation: sugar, water, ferment, heat and air. In the absence of any of these agents fermentation cannot take place.

The material, called the fermentative base, is, after passing through stages of conversion or inversion, if necessary, steeped in hot water for the extraction of its sugar content. This solution of sugars is known as the 'wort'. The 'wort' is cooled to a particular temperature, and the yeast ferment is added to it to start fermentation. This process is called 'setting' the 'wort'. The yeast should be pure, otherwise there is the danger of other organisms, *e.g.,* the acid-forming organisms contaminating the mass. *En passant* it may be noted that a certain amount of yeast is naturally present in the fermentative bases and the temperature employed in extracting the sugars is not high enough to kill it. On the surface of *mahua* flowers, *gur,* etc., certain kinds of yeast are to be found, which start fermentation as soon as the sugars pass into solution. Therefore the sugary solution rarely exists as a true 'wort', which properly speaking is an unfermented liquid, but technically becomes almost at once a 'wash', *i.e.,* a fermenting or fermented liquid. The common practice is to mix *mahua* flowers with spent wash and water (this stimulates natural fermentation) and to pass the whole wash when fermented, including the solid matter, into the still. This is, however, a wasteful process and results in the production of inferior spirits.

Strong solutions of sugars should not be used as alcoholic fermentation cannot proceed in a wash which contains more than 10 per cent of its bulk of alcohol, so that any sugars that remain in the liquor, after this point is reached, are wasted.

It is necessary to regulate the specific gravity of the wash. The specific gravity of the wash when it is first prepared is known as the first or 'original' gravity to distinguish it from the lower gravities found as fermentation progresses. With some indigenous fermentative bases the first gravity does not entirely represent sugars, or other fermentable substances, and in such cases it is necessary to ascertain the proportion of non-fermentable materials by other tests. For the patent still the most suitable original gravity is 1.045 to 1.105, whilst for a pot-still a somewhat higher original gravity is recommended. Different qualities of *mahua* or *gur,* etc., yield different quantities of sugars in solution, and the resulting specific gravity varies with the quality of the base employed. It is therefore difficult to suggest the number of gallons of water that should be added to a certain amount of the fermentative base. In actual practice, therefore, the most suitable initial gravity for the different kinds of bases, under different conditions, should first be determined; and before adding the fermenting agent to the wash it should also be ascertained whether this gravity has already been attained.

Sometimes such substances as ammonium sulphate and sulphuric acid are added to the wash to accelerate the process of fermentation. Ammonium sulphate is utilized as a nitrogen-containing food by the yeast cells. Sulphuric acid, when added, checks the undue growth of the acid-forming substances, such as acetic and lactic ferments, and thus it indirectly helps the action of the yeast. The bark of the acacia tree, *i.e., kikar* (Tamil, *kurruvelam*), is largely employed in sugar washes for similar purposes in the Punjab and Madras and Bombay presidencies on account of its tannic acid content, which precipitates the albuminous matter in the wash and helps in fermentation. It also prevents excessive acid formation in the wash. *Amla,* the astringent fruit of *Phyllanthus emblica,* is used for a similar purpose in Central India.

The temperature of the wash must be regulated to avoid too high a rise or too low a fall, as in the first case improper fermentation results and in the second case fermentation is arrested. The lowest point at

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which fermentation can proceed is 59°F., while 82°F. is the optimum temperature for vigorous fermentation.

The proper length of fermentation depends on many conditions, such as the amount of wash, the temperature, quality of the yeast and the fermentative bases used. A badly managed *jaggri* fermentation sometimes extends up to two weeks. Toddy is by far the quickest and most easily fermented of the bases used in Indian distilleries. Crude toddy fermentation is commonly completed in two or three days during summer and in three to five days during winter.

Colouring and flavouring agents.—After the completion of fermentation, the mass is passed into stills for the separation of the volatile alcoholic contents from the fermented mass, and the distillate thus obtained is diluted to the necessary strength before it is ready for distribution. Caramel is the common flavouring and colouring agent used in this country for spirits. It is prepared by heating sugar when water is removed and a number of bodies of indefinite composition known as caramel and its derivatives are produced. Caramel or 'burnt sugar' is thus a mixture of several compounds. Among the less commonly used flavouring agents may be mentioned ginger, nutmeg, gum acacia, saffron, keora (*Pandanus odoratissimus*), turmeric, fruit of *Helioteres isora*, seeds of *Nelumbium speciosum*, a kind of water-lily, catechu, fennel, aniseed, cardamom, coriander, orange, *mundi nim*, peppermint, mango, *khaskhas*, sweet lemon and rose. Night-jasmine flowers (*Harsinghar sheuli*) and *tesu* flowers are also rarely added as harmless colouring agents. This list, of course, excludes narcotic adulterants such as *Cannabis indica*, chloral hydrate, medinal, arsenic, dhatura, etc., which are sometimes used.

Besides the country spirits, the methods of manufacture of which have been outlined above, there are two other kinds of distilled liquors used in certain parts of this country. These are :—

(*i*) *Mandwa spirit* is one of the choicest distilled country liquors used in Jaunsar Bewar on ceremonial occasions and during marriage or other festivities. It is prepared by baking 16 pounds of mandwa flour into a single cake about 1 inch in thickness and 8 inches in diameter. The cake is then broken into small pieces, mixed with the ferment *khemiki roti* and made into a homogeneous mass with 16 pounds of water. This mass is stored in a large earthen vessel and stirred two or three times a day for 10 to 14 days, during which period fermentation sets in. In the winter season the fermentation may take three to four weeks before the mass is ready for distillation.

(*ii*) *Rakhshi* is a distilled liquor which is used in the Eastern Himalayas, particularly in Nepal and the adjoining areas. It is prepared by distilling the fermented beers used in those parts, *e.g.*, *pachwai* and *margua*. Although distillation is not allowed by law, illicit distillation is carried out fairly extensively in the hills on the borders of Nepal. *Rakhshi*, prepared from fermented rice, is sold by contractors licensed by the Government. This liquor is largely used by the Nepalese section of the population of Darjeeling district and by the higher class Bhūtyas.

Foreign liquors

The foreign potable spirits used in India can be classed under three categories :—

I. *The genuine and fully matured spirits.*—Genuine mature spirits are solutions of ethyl alcohol in water, containing sufficient quantities of the by-products of fermentation which give them a characteristic odour and taste. If old methods of distillation in pot-stills are adopted, larger quantities of esters, higher alcohols, etc., are left in the spirits and these are responsible for the characteristic flavour and taste. Storage in wooden casks improves the flavour because of certain changes in the character and amount of these secondary constituents produced through storage. According to the Unmatured Spirits (Restriction) Act of 1915 all plain spirits intended for human consumption must be kept in bond for a period of three years before issue. In practice, most of the good brands of spirits are stored for considerably longer periods than the three years specified by the British and the French excise regulations. This act does not, however, prevent the use of new spirits in the preparation of compound spirits, such as gin, British brandy, etc., provided that certain excise duties are paid. The retail price of these spirits varies per dozen bottles from Rs. 84* upwards, the longer the storage the higher the price.

II. *Genuine but immature spirits.*—These spirits are genuine in so far as they are made from the same fermentation bases as the genuine and fully-matured spirits. They are generally distilled by means of 'patent stills' and, as a result, an appreciable quantity of the secondary products is left behind, and therefore the long storage process for maturing is not necessary. Quite a large number of such spirits are used in India, such as the various brands of whisky imported from Scotland and brandies from France. They should be regarded as immature spirits as they have not been stored for a reasonable time for maturing. They are sold at a low price of Rs. 40 to Rs. 55 per doz. bottles.

III. *Imitation or fictitious spirits.*—The imitation spirits, also known as artificial spirits, are manufactured by diluting ethyl alcohol (rectified spirit) from which by-products have been removed by means of effective 'patent stills' in such a way that the fermentation base is no longer discernible. Suitable smelling and flavouring agents bearing the odour of genuine spirits are then added to impart the necessary taste and odour to the diluted alcohol. Flavouring agents are usually added in the form of essences such as volatile oils, ethyl nitrite, paraldehyde, acetic acid, acetic ether, almond essence and occasionally traces of hydrocyanic acid, cassia buds, catechyaris roots, absinthe or wormwood oil and various colouring agents. The basic substances in all the essences are esters peculiar to each spirit, *e.g.*, ethyl butyrate and ethyl nitrate in case of whisky; spirits of nitrous ether and amyl caprionate in case of brandy and cognac. Imitation spirits contain smaller quantities of by-products than genuine spirits and have, therefore, a comparatively mild taste.

For the past 20 years the use of such spirits has increased considerably in this country. Many different brands of these imitation spirits simulating whisky, brandy, rum, etc., were imported from Japan, Germany, Holland and other countries. They are sold at a considerably lower price than the genuine spirits; the price being Rs. 30 to Rs. 40 per dozen bottles.

* All the prices quoted are pre-war.

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They owe their cheapness to the cheap fermentation bases such as potatoes, rice, etc., from which they are distilled. On account of their low cost and milder taste they are becoming more and more popular every day.

Varieties of foreign liquors.—The foreign liquors may be classed in the following three groups:—

(1) *Fermented liquors (undistilled).*—Wines are obtained by the fermentation of grapes or other fruits. The fruits from which the wine is to be manufactured are reduced to a fine pulp which is allowed to ferment naturally; this fermentation is due to the yeasts naturally present on the skin of the fruit. The fermented liquor is then strained and casked ready for use. If fermentation is allowed to the extent that almost all sugar present is fermented, the resulting wines are termed 'dry wines', but when the process is incomplete and the liquor contains a relatively large amount of unfermented sugar, it is called 'sweet' or 'full-bodied' wine. To prevent further fermentation and to prevent the liquor from turning sour in the tropics, alcohol, usually brandy, is added; this acts as a preservative and the process is called 'fortification'.

Wines are usually named after the places of their manufacture. Thus 'Medoc' is the produce of Medoc in France. 'Sherry' is imported from Xere in Spain; and the name 'Port' is applied to all wines shipped from Oporto. No wines are at present made in British India, though some years back small quantities were made in Kashmir.

(*a*) *Cider and perry.*—Cider and perry are made from apples and pears, respectively. The consumption of these liquors is small. Some time back some cider was made in Kashmir, but not in any other part of India.

(*b*) *Malt liquors.*—These are made from malt and hops by steeping specially-prepared or 'malted' grain in water; the solid matter is strained off and the liquid thus obtained is boiled with hops: the hops are next strained off and the strained liquor is fermented by adding specially prepared yeast. After fermentation is complete, the liquid is allowed to settle and is then casked for use. At the present time, glucose and other similar materials are largely used in place of malt, and hop substitutes are occasionally used in place of hops. Malt liquors are used extensively all over India, especially in towns during the hot weather. The malt liquors commonly used in this country are beer, ale, stout and porter.

Pale ale is made from the best malt with the addition of an especially large amount of hops.

Mild ale contains more alcohol and extract than the above.

Porter is a black beer made with specially prepared malt, which gives it its special flavour and colour.

Stout is a strong porter.

Lager beer is a light beer containing more carbonic acid gas than ordinary beer on account of the distinctive modes of fermentation carried on at low temperatures by special kinds of yeast. It should be stored at low temperatures.

(2) *Distilled foreign spirits.*—They can be distinguished according to British Tariff from enumerated and unenumerated spirits.

Enumerated spirits are those which have the distinctive flavour of the substances from which they are made; the common examples being whisky, brandy and gin.

(*a*) *Whisky* is an alcoholic liquor made by distillation from a fermented mass of cereals treated with malt. It may also include other spirits prepared with the distinctive colour, odour and taste of whisky.

(*b*) *Brandy* is distilled from grape wine.

(*c*) *Rum* is the spirit made from various products of sugarcane. Imitation rums are made from bases other than sugarcane and are coloured and flavoured so as to resemble genuine rum. The spirit made or compounded in India for sale as rum under foreign liquor licenses is, before issue, generally coloured with caramel.

(*d*) *Gin* is a colourless spirit, sweetened or unsweetened, distilled from grain or other bases such as barley, rye or maize. It is flavoured with juniper berries or other flavouring agents so as to possess the characteristic taste and odour of gin.

Unenumerated spirits.—All other imported spirits are classified as enumerated spirits. The most common of the unenumerated spirits of high strengths, made from potatoes and other bases, are used largely for compounding. These are commonly known as 'silent' spirits, inasmuch as they give no indication of their origin.

Liqueurs, etc.—These are, as a rule, imported artificially-flavoured spirits. They are compounded with a variety of flavouring, colouring or sweetening agents. The methods of production are usually trade secrets. Many British-made liqueurs are commonly known as 'Cordials'. 'Bitters' are spirits compounded with bitter flavouring agents.

Fermented country liquors (country beers)

Country beers used in India are obtained either directly from plants as saps or juice, or from the cereals through the process of brewing or fermentation.

A. *Natural fermented juices*

Tari, or toddy as it is sometimes called, is a common beverage in certain parts of India. It consists of the fermented or unfermented sap of different kinds of palm trees. The stems of several palms contain large quantities of starch as reserve food, especially the species which save up for a large terminal inflorescence, *e.g.,* sago palm (*Metroscylon sagu* Rottle) of Malacca, from the pith of which sago is also obtained. In several palms there is a great flow of the sap towards the inflorescence and by tapping the plant large quantities of a sugar-containing fluid are obtained. The palms already tapped as sources of toddy in India are: Palmyra palm* (*Barassus flabellifer* Linn.), Cocosmucifera, Caryotaurens, wild date palm (*Phœnix sylvestris* Roxb.), Nipa palm or water coco-nut (*Nipa fructicans* Wurmb.), *Arenga wiggle* Goliff, etc. The sap thus collected is known as toddy and when fresh it forms a favourite drink in tropical countries; after fermentation it acquires intoxicating properties. The distillation of the fermented toddy produces a strong spirit known as palm wine or *arrack.*

Method of tapping.—The method employed in extracting the sap of palmyras or coco-nut trees is to cut off the end of one of the flowering shoots and place a collecting-pot underneath it. A fresh slice is cut off every day and the shoot bruised with a wooden hammer or a pair of crushers to draw out the sap. In the case of date palms, a portion of the stem is chopped off and the sap running down is drawn into the pot by a leaf or wooden peg inserted in the incision. Care should be taken in tapping date palms to see that the life of the palm is not endangered by the operation or through the exposure of a soft surface to the ravages of white-ants, crows, rats or squirrels or of the palm

* Palmyra palms (*Barassus flabellifer*) are cultivated throughout the tropical parts of India, *e.g.,* Bengal, Assam, the Central Provinces, Bombay, Madras, Malabar and in the southern parts of the United Provinces. In most of these places, the plant also grows wild along with coco-nut and date palms, which are also used for making *tari.* Palmyra is prized more for its *tari* in the south than in the north. On the other hand, the juice from wild date palm *Phœnix sylvestris* is more liked in Bengal and Behar than elsewhere. On the Western Coast, in Gujrat and Kathiawar, wild date trees grow abundantly and form the chief source of this drink. *Sagu* and *dadasal* palms are also tapped when other kinds are not available.

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weevil *Rynophorus ferrugineus*, which is the most destructive of all. The actual technique of making an incision varies in different places. In Madras Presidency a horizontal cut is made immediately under the apex of the palm and a triangular section, which grows deeper with each day's tapping, is removed below it. This is sometimes divided into two by a ridge which is left as a support for the apex. In Bombay Presidency a comparatively narrow section passing from below upwards is scooped out to one side of the centre of the stem. In Bengal the incision extends half way round the trunk but it is much shallower than in the Madras or the Bombay presidencies and, unlike the Madras incision, its broadest portion is at the base. Experience shows that the Bengal process is much the least destructive. To prevent the destruction of trees, the following precautions should be observed:—

No incision should be made at any point within four feet of the ground, or one foot from the base of the central whorls, or 18 inches from the top of any incision, and it should not be deeper than one-third of the diameter of the tree. No tree should be tapped oftener than in alternate years and not for more than six months in the year. The tappers should leave not less than eight leaves at the top of the tree in addition to the central whorls springing from the head of the tree.

Seasons of yield.—Coco-nut *tari* can generally be obtained all the year round; but the yield of palmyra and date *tari* is limited to a certain season which varies from October to March in the case of date palms, and from April to June in the case of palmyras.

Quantity of yield.—The quantity of *tari* yielded by different kinds of trees varies a great deal according to localities. The result of a series of experiments conducted in Madras has shown that the average annual output of a coco-nut tree is 70 gallons and that of a palmyra or date palm 27 gallons. In Bombay Presidency, observations indicate that a palmyra yields as much as a coco-nut palm and that the average annual yield for either varies from 90 to 111 gallons. Observations carried out in Bengal show an average yield of 43 gallons for male and 57 for female palmyras in their best season, and of 25 to 30 gallons in case of date trees.

Present extent of tari *consumption in India.*—The chief *tari*-consuming areas are most parts of Bombay Presidency, Bengal, certain districts of Behar and Orissa adjoining Bengal, Gorakhpur and Benares divisions, and Farrukhabad district of the United Provinces, the whole of the Madras Presidency except the Nilgiris, Nagpur, Amraoti, Wardha, Chanda districts of the Central Provinces and Berar and Coorg. The consumption varies in different seasons of the year, being greater during the hot summer months than in the winter.

Owing to large variation in the number of trees in different provinces, and the absence of any regular records of the number of trees tapped, it is difficult to make even a rough estimate of the total or comparative consumption. The following figures may, however, serve to give some idea :—

TABLE I

The present position of tari *consumption in different Provinces of India*

Province	Geographical extent of use and tree-tax system	Revenue in lakhs of rupees	Kind of trees tapped	Total number of trees tapped	Consumption in bulk gallons
Bombay Presidency ..	Whole of the Presidency, especially in Surat Thana, island of Bombay-Kolaba district and Panch Mahals.	71,15,000	Coco-nut, date and palmyra.	20,646	207,017
Madras Presidency ..	Whole of the Presidency except part of Nilgiri districts and Attapady valley in Malabar and portion of Agency Tracts.	2,15,37,000	Coco-nut palms, *sagu* palms, palmyra, date palms and *dadasal*.	2,096,950	7,691,347
Bengal Presidency ..	Throughout the presidency.	7,61,000	Date palms, palmyra and coco-nut.	998,968	Not used
Central Province and Berar.	Nagpur, Hasangabad, Bhandara, Jubbulpur, Chanda, Wardha, Nimar and Dangar districts.	46,47,000	Palmyra and date palms.	Not available	637,720
United Provinces ..	Basti and Gorakhpur	7,86,000	Date palms and palmyra.	Do.	Not available
Assam	Goalpara, Kamrup, Nowgong and Lakhimpur districts.	7,420	Do.	Do.	Do.
Behar	Patna, Gaya, Saran, Muzaffarpur, Darbhanga, Monghyr and in Majai portions of the Shahabad, Champaran and Bhagalpur districts.	2,496	Do.	Do.	Do.
Orissa	Ganjam district	85,000	Date palms	Do.	Do.
Coorg	All over	83,000	Palmyra and dates	Do.	Do.
Punjab, Delhi and British Baluchistan.	Not used				

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Fresh and fermented juices.—It is commonly believed that if trees are tapped before sunrise the juice obtained is sweet and agreeable to taste. Fermentation, however, sets in rapidly if it is drawn after sunrise, the juice being converted into an intoxicating drink, toddy or *tari*.

Fresh tari *or sweet* tari.—*Fresh* tari is the name given to *tari* that is freshly drawn; it is popularly supposed to be non-alcoholic and to possess wholesome properties. It is interesting to note that *tari* ferments very readily, partly because the solution is favourable for rapid fermentation and partly on account of the fact that the utensils in which the juice is drawn are almost invariably coated with old ferment. The rate of progress of fermentation varies according to the kind of tree tapped and the temperature. Thus, when the temperature is below 60°F. or when a new or smoked pot is used on a tall tree, or when some chemicals are added to arrest fermentation, the *tari* contains practically no alcohol.

The term *fresh toddy* designates toddy in which nothing has been done to check fermentation and which is consumed just after it is tapped from the tree and before fermentation is far advanced. *Fresh* or *sweet toddy* is supposed by the Parsees to have medicinal properties, chiefly as a diuretic, and is largely used in Bombay, Surat and in some parts of Assam, Bengal and Madras presidencies.

Sweet toddy is the name given to *tari* in which the fermentation has been arrested by the addition of lime. It is used both for drinking and for sugar making, and is especially popular in Madras and Bombay presidencies. The lime may be placed loose in the pot or, preferably, as a thin paste coated over the inside. For all practical purposes unfermented or natural *tari* is very difficult to obtain. The juice which is commonly sold as *fresh tari* shows an average strength of 94% U.P.

Alcoholic content.—The alcoholic content of various kinds of *tari* vary according to the variety of the palm tapped, the season of the year, the time at which it has been drawn and other circumstances, such as the presence or absence of lime in the utensils.

The average alcoholic content of different forms of *tari* obtained from different kinds of palms in India is given in table II.

TABLE II

Alcoholic strengths of tari *from different kinds of palms in Madras Presidency (after Bedford)*

Coco-nut	85.7 U.P. or 8.1 per cent.
Palmyra	90.8 U.P. or 5.2 „
Date	91.4 U.P. or 4.9 „
Sagu	89.6 U.P. or 5.9 „

The alcoholic strength of *tari* used in Bengal varies from 92% to 95% U.P. It possesses approximately the same food value as good malt beers sold in this country. Recent inquiries made by the authors show that the juice is preferred in the following order according to the nature of the tree, *i.e.*, coco-nut, palmyra (fresh palm) and date palm.

Price.—The retail price of *tari* during the season is 6 pice a gallon in Bengal, Behar and Orissa, but it rises to 4 annas in other parts, such as Eastern Bengal and Assam, where the trees are fewer in number. It varies from 2 to 4 annas per gallon in the United Provinces, where it even goes up to 6 to 8 annas per gallon in special localities. In Madras Presidency the average price ranges from 4 to 5 annas per gallon, except in South Kanara where it is only 2 annas per gallon. In Bombay Presidency different prices are fixed for different areas; in Surat district, where the trees are abundant, it can be had at 6 pice per gallon. In Bombay city, the usual price varies from 3 to 4 annas per gallon. In the Central Provinces the price varies from 6 to 4 annas a gallon.

Some medicinal uses of tari.—In addition to its other uses, *tari* is commonly employed as a stimulant and antiphlegmatic. If taken regularly, freshly-drawn *tari* acts as a good laxative. It is also believed to be useful in inflammatory and dropsical conditions, and is regarded as a nutritive, diuretic, tonic, and a cure for gonorrhœa. A stimulating soft poultice prepared from toddy and rice-flour is regarded as a valuable stimulant application for gangrenous, indolent ulcers, carbuncles, etc. The unfermented juice is very often taken in early mornings, and is supposed to aid digestion and increase the weight. The fresh juice is regarded as a stimulant and antiphlegmatic by the indigenous *hakims* and *vaids*. Slightly fermented juice is used in diabetes. The fermented juice acts as a purgative.

Mention may be made here of the utility of the indigenous toddy in India. Toddy has been a blessing in the tropics for the prevention of of beri-beri or hypovitaminosis. As the sunlight and fresh air make good the deficiency of vitamin D in all ill-nourished inhabitants of slum areas, toddy very often makes good the vitamin-B deficiency caused by the consumption of milled and polished rice. The nutritive qualities and vitamin content of the beverage probably compensate for its harmful alcoholic content. It has been observed by the present authors that in areas where the use of toddy is prevalent, deficiency diseases caused by vitamin B deficiency are rare. Epidemics of polyneurities, anæmia, beri-beri and certain varieties of dermatitis are quite common in localities where these beverages are not used.

B. *Artificially fermented country beers*

The fermented country beers used in India are brewed from rice, barley, millet and sometimes from *gur* or *mahua*. They are known by different names in different parts of India. In table III are summarized the vernacular names of these beverages, the cereals from which they are brewed and the localities in which they are used.

TABLE III

Vernacular names of beers and the materials used for their brewing	Localities in which used
1. *Sur, lugri, chang* (from mandwa and rice).	Kangra district, Lahoul and Spiti valley in the Punjab and Kashmir.
2. *Chami* (from rice and millet).	Kashmir.
3. *Rabra, soma, pakhwai, boja, darbahra* (from rice and millet).	Jaunsar taluk of Dehra Dun district in U. P. and Bhutya taluk of Kumaon division.
4. *Pachwai, mandia, marua, jaur, chanua, nigar, kusha, sugda* (from rice and millet).	In the western districts of Bengal, Behar and Orissa, Bhutan, Sikkim and eastern parts of Nepal.
5. *Madh, zu, laopani* (from rice).	Assam, Nagas, Sadiya Frontier Tract and Tibeto-Burman tribes.
6. *Boja, londs, sonti soru* (from millet).	Bombay, particularly Maharastra, and in the Madras Presidency.
7. *Akki, bhoja* (from rice and millet).	Mysore plateau.
8. *Congee* (from rice and millet).	Used in Burma by Khyen and Karens.

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C. *Method of manufacturing* Pachwai *and other common country beers*

Two essentials required for the manufacture of these beers are: (1) fermenting material and (2) cereal to ferment.

1. *Fermenting material*

This is generally supplied in the form of cakes of coarsely-ground corn permeated with dry and empty mycelial filaments of mucor, bearing numerous reproductive bodies in the form of chlamydospores. It also contains a certain proportion of the root tissue of a species of *Polygala* which secures in them the presence of a number of reproductive fungal elements capable of retaining their vitality for prolonged periods, if kept dry. The proportion of polygala in the cakes has to be carefully regulated as an undue proportion may lead to suppression of growth of the fungal elements. On the other hand, any defect may fail to suppress the common and useless fructification of the fungus. It is interesting to visualize how such difficult formulæ of the proper proportions of the various constituents of these cakes have been worked out by the uncivilized or semi-civilized tribes, who resort to the use of these beers. These ferments are manufactured and sold throughout the whole length and breadth of the Himalayas and are sometimes imported from Tibet. In places where the use of these drinks is very prevalent, the ferments are prepared locally under different names by certain tribes, and the secrets of their composition are carefully guarded. In their preparation a large number of essential elements are mixed with a number of others which are not only unnecessary for fermenting processes, but, as is explained further on, are sometimes poisonous and extremely dangerous to health. The most important of these are described below:—

(*a*) *Bakhar.*—This is the most widely used of all the ferment materials in the manufacture of the rice beers, such as *pachwai*. It is stated in the report of the Bengal Excise Commission (1883–84) that 166 different plants and 45 different species have been used in its manufacture. The authors were able also to collect over a dozen recipes from the *bakhar* manufacturers of Birbhum and Sonthal Parganas. It was found that one hundred varieties of roots and 30 varieties of stems, leaves and flowers including poisons—dhatura, aconite and nux vomica—are used by different people in its manufacture. The commonest ingredient is a plant called *Rannu* in Sonthali. Another common ingredient of the cakes is a plant known as *Serum lutui* (*Clerodendron serratum*) which is used especially to enhance the intoxicating properties of the beer. In the northern Himalayas a grass, *Hardeum vulgare* Linn., is employed in the manufacture of these ferments.

According to Ray (1906), the plants used in the preparation of *bakhar* may be divided broadly into four groups with respect to their known general properties:—

1. Medicinal plants, *e.g.*, *Tribulus terrestris* (gokhur), *Desmodium gangaticum* (salpan), *Uraria lagopodioides* (chakulia), *Splanum jacounni* (kantakari), *Hemidesmus indicus* (anantamul), *Asparagus racemosus* (satamuli), etc.

2. Bitter principles, *e.g.*, *Andrographis paniculata* (kalmegh), *Oldenlandia herbacea* (khetpapra), *Azadirachta indica* (nim), *Justica adhatoda* (basak), etc.

3. Certain tannin-containing plants, *e.g.*, *Terminalia chebula* (haritaki), *Terminalia tomentosa* (poasil), *Cassia fistula* (sendal), *Diospyros tomentosa* (kendu), etc.

4. Narcotics, *e.g.*, *Datura* (dhutura), *Plumbozo zeylanica* (chita), *Strychhnos nux vomica* (kurhila), *Cannabis sativa* (sinddhi), *Aconitum palmatum* (bikhuma), etc.

The first investigation of a scientific nature regarding *bakhar* was made by Ray (1906) and according to him the saccharification of rice and also the subsequent alcoholic fermentation are due to the activity of a micro-organism present in *bakhar*, to which he gives the name *Mucor torula*. The next investigation on *bakhar* was made by Hutchinson and Ram Ayyar (1915). Contrary to the view expressed by Ray, these authors concluded that the changes were brought about by two distinct classes of micro-organism, namely, mucors and yeasts. Interesting observations were also recorded by these workers with regard to the relative physiological activities of the different micro-organisms found in *bakhar*. A fungus named *Aspergillus oryzoe* isolated from the Japanese *koji*, a substance analogous to the Indian *bakhar*, was found to possess the greatest saccharifying activity. Several specimens of *bakhar* were prepared in the Pusa laboratory by mixing pure cultures of *Aspergillus oryzoe* and other mucors with yeasts, and the comparative strengths of the alcohol produced by them from rice were recorded. Attempts were made by these workers to produce the crude *bakhar* from cultures of mucors and yeasts. *Aspergillus oryzoe*, a fungus isolated from *koji*, and several varieties of yeast were utilized in the preparation of different types of *bakhar*. The results, however, were not satisfactory. The maximum strength of alcohol obtained by the action of these *bakhars* on rice was 33.7 per cent (59 per cent proof) by volume, that recorded with ordinary crude *bakhar*, thus showing that the product obtained experimentally in the laboratory was not identical with the crude product. Although the peculiar apple-like odour associated with the growth of *Aspergillus oryzoe* was present, the taste of the *pachwai* prepared from the laboratory *bakhar* did not generally come up to the standard and liking of the consumers. *Mucor amylomycas* used in European distilleries is very similar to the organism found in *bakhar* and other fermenting substances used in the preparation of these beverages.

(*b*) *Kemki roti.*—This is the ferment used in Jaunsar and in the western Himalayas. Powdered and dried roots of several hill plants* are mixed with four times their weight of *mandwa* flour and made into a cake 2½ inches in thickness and 10 inches in diameter. The cakes are then covered with straw and placed in a dark room for eight days or so, depending on the time of the year; after this they are taken out and dried in the open air for four days. The black fungal growth which occurs on their surface is wiped off, and the cakes are then ready for use.

(*c*) *Murcha cakes.*—These are commonly employed in the eastern Himalayas, Assam and Bhutan hills. The outer skins of the roots of certain wild plants, such as *bhimsenpati* (*Buddleia asiatica*), *lour* and *waddinghang-ma* (*Polugala arillata* Han), are dried, powdered and mixed with other ingredients in the following proportions: 6 oz. of dried roots, 1 oz. of dried ginger, 12 oz. of rice flour, and 6 chillies.

Sometimes one or two seeds of *Strychnos nux vomica* are added. The mass is kneaded into a dough with water and small round cakes are prepared from it. The cakes are dusted with an old powdered cake from a previously-manufactured batch, covered with fern leaves and kept in a dark room for three or four days. When taken out they are dried and subsequently kept dry by storage near a fire-place.

The Lepchas and Lushis as well as the Nagas make rice beer without adding any special ferment.

*The vernacular names of the plants used are *chhamur, artoo, mukrand, pahar, baru, charwa* or *chharants, doodh pal* and *sonti*.

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2. *Cereals used and process of preparation*

(*a*) *Pachwai and handia.*—These rice beers are the most extensively used of all the country beers. The process of manufacture is simple. Rice is boiled and spread on a clean floor or on a mat, mixed with finely powdered cakes of *bakhar* in 100 to 1 proportion, and left in an earthen vessel in a dark place, for fermentation. After 4 to 10 days or longer, depending upon the atmospheric temperature and the progress of fermentation, it is taken out. The mass is then diluted with water and distributed for consumption. The washings are repeated till the mass is bereft of all its alcoholic content and the rice is thrown away or given to pigs.

(*b*) *Sur* and *lugri* are similar beers prepared from fermented rice and sometimes from other cereals in Kangra district.

(*c*) *Zu*, a weak country beer, is the national drink of Angami Nagas. It is prepared by pouring boiling water on rice and leaving the infusion for two or three days in a dark place, whereby the fluid is fermented. It forms a refreshing and exhilarating drink. No special ferment is said to be added for assisting fermentation in the process of its manufacture, enough ferment being present in the unwashed troughs to start the process.

(*d*) *Marua* beers (*i.e., chang, jaur, niger, chanua*).—These beers derive their names from a millet called *mandwa* which forms the staple food in most of the hills. The grain is husked, boiled with water, cooled, and thoroughly mixed with the ferment *marcha;* two to four cakes of the ferment are added to a maund (82 lb.) of the boiled grain. The mass is then spread over the floor of a room to a depth of 8 to 10 inches and kept there for 42 to 48 hours to allow the moulds to develop and spread throughout the mass. The whole mass is then transferred to bamboo baskets wrapped in plantain leaves; this probably prevents the introduction of extraneous organisms from the air. The baskets are kept in a dark place for 15 to 20 days for the organisms to produce the desired effect. After this period the grain is ready for use. Some of the prepared grain is placed in a vessel consisting of a bamboo cylinder known as *changi;* hot water is poured into it and the mixture left for some time. The liquor is then drawn through a thin reed or a bamboo pipe. The vessel may be replenished repeatedly with hot water until the grain is exhausted. If an amount of water equal to that of the grain is added, the wash obtained is called *niger;* but if twice the amount of water is added the resultant beverage is called *chanua.* The alcohol content of the liquor, when used in this manner, is very low (less than 1 per cent by volume) and people take delight in sipping it from morning to evening. The percentage of ethyl alcohol rises to 6 or 8 per cent, only when the fermented grain is kept steeped in an equal amount of water for 24 hours.

(*e*) *Pakhwai.*—This is the common beverage in the western Himalayas and the Jaunsar Bewar Pargana of Dehra Dun district. It is prepared in a slightly different manner from that described for *marua* beers. A maund of the flour made from one of the common cereals, usually *mandwa,* is made into thick cakes, which are crushed, mixed with the ferment *kemki roti* and kept for four to five days in an earthen vessel of a capacity of about four maunds. Usually fermentation starts after this period. The vessel is next filled with water and again kept in a cool place for about six to eight weeks for the completion of fermentation. The resultant fluid is called *pakhwai,* and the semi-solid material left behind is called *rabra.* The latter contains alcohol and is used as food.

Cereals used and composition of beers

The cereals most commonly employed are rice and *mandwa.* The husked grain has the following composition :—

	Rice, per cent	*Mandwa,* per cent
Water	12.8	13.2
Albuminoids	7.3	7.3
Starch	78.3	73.2
Oil	0.6	1.5
Fibre	0.4	2.5
Ash	0.6	2.6

During the process of manufacture, starch is converted into sugar, which is subsequently converted into alcohol. These changes are brought about through the agency of various moulds and yeasts present in the fermentation cakes. Moulds, such as *Phizopus, Cambodja, Demantum* and *Penicillium,* and one kind of yeast enter into the fermentation cakes either from the skin or roots of the various plants used, from the air, or from the green leaves used for converting the cakes during the process of their manufacture. The enzyme amylase secreted by these moulds changes the starchy matter into maltose, which is then converted into glucose and ethyl alcohol by the activity of the maltose and zymase of yeast. Fermentation enzymes are also secreted by the moulds to a small extent.

Besides diluted ethyl alcohol, these liquors contain starchy derivatives such as dextrine, malto-dextrine, maltose, etc., which have not been fermented. The food value of these liquors is, therefore, substantial. The nature of the by-products depends upon the character of the grain and the fermenting material used. In most of the fermented liquors glycerol is formed from decomposition of sugars by yeast; fusel oil is formed from amino acids by the decomposition of proteins present in the grain; succinic, formic and acetic acids and some other acids may be formed as a result of bacterial contamination. Besides these, many esters, aldehyde and ketone bodies responsible for the smell and taste of the fluids are formed.

Alcoholic strength.—The fermented mass has a semi-solid consistency and contains fair quantities of alcohol. The strength of the ultimate product depends partly upon the nature of the grain employed but more upon the amount of water added for dilution. The amount of water added varies in different places, amongst different tribes, and according to the occasion on which the liquors are used; for instance, the liquor drunk at festivals and marriage ceremonies is much stronger than that used for daily consumption. Bedford, at the instance of the Indian Excise Committee (Thomson *et al.,* 1907), examined the alcoholic content of a number of samples of rice beer collected in various parts of India, and his results are given in the following table:—

TABLE IV

Average strength of country beers (1905-1906)

Province	Number of analyses done	Percentage of absolute alcohol by volume
Bengal	8	6.4
Eastern Bengal	4	6.9
United Provinces ..	1	13.6
Punjab	3	6.3
Burma	7	9.9
Mysore	1	4.1

(*Concluded on opposite page*)

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ÆTIOLOGY OF GLAUCOMA, ITS VARIOUS METHODS OF TREATMENT AND THEIR MERITS

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GLAUCOMA is not a disease *sui generis*. A glaucomatous eye is only a diseased eye in a diseased body—its one characteristic being increased intra-ocular tension.

(*Continued from previous page*)

In the following table are given the results of the analysis of similar specimens examined at the Municipal Health Laboratory, Darjeeling, during recent years :—

TABLE V

The results of the analyses of country beers carried out at the Municipal Health Laboratory, Darjeeling

Number	Specimen	Specific gravity	Percentage of ethyl alcohol by weight	Percentage of alcohol by volume
1	Undiluted *pachwai* and *chanua*.	0.9870	13.1	22.9
2	Undiluted *pachwai* and *Niger*.	0.9981	10.68	18.7
3	Undiluted *chanua*.	0.9894	2.65	4.6
4	Diluted *pachwai* and *Niger*.	0.9915	10.85	19.0
5	Do.	0.9803	4.33	7.6
6	Do.	0.9864	4.03	14.1
7	*Chanua*	0.9888	6.71	14.6
8	Do.	0.9968	1.8	4.0
9	Do.	0.9933	..	8.7
10	Do.	0.9945	..	6.8
11	Do.	0.9884	..	12.9
12	Do.	0.9915	..	10.8
13	Do.	0.9895	7.5	13.5
14	Do.	0.9905	9.09	12.4
15	Do.	0.9888	..	14.6
16	Do.	0.9932	..	8.29
17	*Niger*	0.9865	8.29	18.03
18	Do.	0.9944	3.1	7.0
19	Do.	0.9894	..	3.7
20	Do.	0.9930	..	8.75
21	Do.	0.9896	..	14.5
22	Do.	0.9894	..	13.7
23	Do.	0.9932	5.0	8.7
24	Do.	0.9822	14.18	24.8
25	Do.	0.9899	..	12.95
26	Do.	0.9876	..	16.4

REFERENCES

HUTCHINSON, C. M., and RAM AYYAR, C. S. (1915). *Mem. Dept. Agriculture in India*, Bact. Ser., **1**, No. 6.
RAY, J. C. (1906) .. *J. Asiatic Soc. Bengal*, **2**, 129.
THOMSON, J., *et al.* (1907). *Rep. Indian Excise Committee*, 1905–06. Supdt., Govt. Printing, India, Calcutta.

(Part II will appear in our next issue)

The disease is divisible into the following two groups :—

1. *Primary glaucoma*—also called idiopathic glaucoma. It may be acute or chronic. Chronic glaucoma comes on without any evident fundamental cause.

2. *Secondary glaucoma*.—There is always some evident cause to explain its onset.

1. PRIMARY GLAUCOMA

(*a*) *Acute glaucoma*

Ætiology.—The exact cause is an unsolved problem. According to Priestly Smith the most probable cause is the growing lens with advancing age, which by narrowing the circumlental space causes obstruction to the aqueous secreted by the ciliary processes. This narrowing becomes all the more acute in any sudden congestion of the ciliary body. The lens is thereby pushed forwards and by pushing the iris in front of it, it causes obstruction of the irido-corneal angle, thereby causing obstruction to the outflow of the aqueous and an onset of acute glaucoma. A spontaneous diminution of congestion of the ciliary body may for the time being cause subsidence of the acute attack until such time that the attacks are repeated leading to chronic glaucoma.

Primary glaucoma is a disease of the late adult, is commoner to Jews and is sometimes hereditary, in which cases it shows anticipation.

It is commoner in the female sex who are prone to suffer from congestion in various parts of the body and more subject to emotional influences; also near the climacteric period when there is an endocrinal disturbance leading to sympathetic-parasympathetic imbalance, the correct working of which is responsible for the proper working of the vascular system.

The disease is commoner in hypermetropes than in myopes—in the former, probably due to small eyes with small corneæ and consequently a narrower circumlental space, which is further narrowed from the hypertrophy of the ciliary body due to a constant effort at accommodation. With increasing age the anterior chamber becomes shallower, causing narrowing of the angle of filtration. This, combined with sclerosis of the pectinate ligament, natural to old age, leads to obstruction in the outflow of the lymph. Any sudden narrowing of the angle, *e.g.*, crowding together of the iris under atropine, may precipitate an attack. In this connection it is interesting to note whether atropine leads to glaucoma by crowding together of the iris and narrowing of the filtration angle or by relaxing the tone in the vast vascular area of the uveal tract, because suprarenin, in spite of dilatation of the pupil, causes lowering of tension instead of causing a rise. The mere swelling of the lens in cataract may induce glaucoma in eyes predisposed to it.

Koeppe and Barkan have shown deposits of pigment granules and flakes of the anterior capsule of the lens blocking the filtration angle and

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the meshes of the pectinate ligament in old age, and they consider these factors as important causes in the ætiology of glaucoma. The theory of formation of aqueous by the glandular activity of the epithelium of the ciliary processes has given way to that of dialization from the blood plasma through a semi-permeable membrane—the capillary walls. It has been established that glaucoma is a symptom complex of vascular origin, the capillary and venous stasis playing an important part and the glaucomatous eye being a sick eye in a sick body reacts to it. It has been established beyond doubt that increased permeability plays an important part in the ætiology of glaucoma associated with epidemic dropsy. It is probable that the histamine-like body which has been proved to be present in epidemic dropsy and the action of which is normally neutralized by the tonic constrictor effect of the pituitary and the adrenals, may predispose to glaucoma. That it is the vascular element, which plays a more important rôle in the ætiology of glaucoma and not the obliteration of the filtering angle, is shown by the effect of adrenalin which in spite of dilatation of the pupil reduces tension by constriction of the arterioles and thus reduces engorgement.

In this connection it may be relevant to say that eserine acts not by the contraction of the pupil, but by stimulation of the parasympathetic, producing increased flow by the dilatation of the arterioles, the action of atropine being harmful by a directly antagonistic action producing stasis of the vast vascular area of the uveal tract. Pilocarpine and acetylcholine, like eserine, also act by stimulating and assisting the venous return. In the sympathetic parasympathetic control of the intra-ocular circulation, preponderance of sympathetic irritation leads to dilatation of capillaries and congestion of the uveal tract.

This is borne out by abolition of the sympathetic stimuli after the excision of the cervical sympathetic, which lowers the intra-ocular tension. Septic and other irritation factors have also an influence in raising the tension, *e.g.*, the increase of tension sometimes following herpes ophthalmicus.

Further factors in the control of the tone of blood vessels are the action of hormones of the suprarenals, the thyroid and the pituitary. The fact that stasis plays an important part is further revealed by the tension in the eye being at its highest between 3 and 6 a.m., when the circulation is at its lowest throughout the body, and it is common knowledge that the disease had a predilection for this period of the day.

Arteriosclerosis forms a further basis of the lack of velocity in the vascular tone and that is probably one reason that the incidence of glaucoma increases with age. Apart from this, high blood pressure is not an essential, not even an important, factor in the ætiology of glaucoma. Its occurrence in the glaucomatous age is accidental and not essential. On the other hand, obstruction to venous outflow is a more important factor, this being revealed by a perivascular infiltration in the anterior ciliary veins and in vortices in glaucomatous eyes. Earlier onset of increased tension in tumours of the ciliary body more than in tumours further back is also explained by the pressure over the vortices in the former, apart from pushing forward of the iris and narrowing of the filtering angle. That vasomotor disturbance plays an important part in the ætiology of glaucoma is further borne out by the onset of glaucoma at the height of an emotional crisis and at the climacteric period in women, when such disturbances are common. Certain factors associated with glaucoma, *e.g.*, optic atrophy and glaucomatous cupping, are also attributed to the vascular changes rather than to increase of the intra-ocular pressure. Troncoso attributes atrophy of the optic nerve to malnutrition all over the retina through ischæmia due to sclerosis of the artery supplying the retina and the optic nerve, or to functional ischæmia in which there is impairment of velocity of the blood flow, leading to inadequate outflow of the toxic products, which leads to degeneration without inflammatory reaction, and Schnabel explains the cupping of the nerve head by the retractile influence of the cicatrical tissue in the retrobulbar portion of the nerve and the ischæmic degeneration of the sclerotic resulting from arterio-sclerotic changes.

Stasis in the uveal tract results in accumulation of toxic metabolites such as carbon dioxide, lactic acid and chlorine, and some of these cause a toxic degeneration of the retina. It is on the basis of some of these facts that Fischer and Thomas have tried to reduce the tension of the glaucomatous eyes by giving subconjunctival injections of sodium citrate. Inflammation plays little part in production of glaucoma, as is evident in iritis in which, in spite of the highly aluminous aqueous loaded with white and red cells, tension does not rise very much. Only in the presence of stasis of circulation in capillaries and veins does inflammation produce obstruction.

Treatment of acute glaucoma.—The treatment should be energetic. For a short time medical treatment may be tried till preparation can be made for surgical treatment. This consists in reducing general vascular and intra-ocular tension by purgatives, intravenous injections of hypertonic solutions, *e.g.*, 100 c.cm. of 50 per cent sorbitol or a 10 per cent saline 150 to 200 c.cm. It is particularly useful in cases going dangerously high and in cases in which tension cannot be controlled by miotics or their use is considered undesirable on account of plastic exudates. During this period eserine (1 per cent) may be put in every 5 minutes for the first half hour, one drop being placed in the healthy eye as well, and then every half hour

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till tension falls. Hot fomentations and aspirin give relief. If after an hour or two no improvement in tension occurs, a combination of 20 per cent solution of mecholyl—a derivative of choline with 5 per cent solution of prostigmine—has given good results. Acetylcholine and its derivative doryl by influencing the tone of the blood vessels in favour of parasympathetic predominance in contrast to sympathetic predominance, also act beneficially. Doryl has more prolonged therapeutic effect than acetylcholine. It has a complementary action in conjunction with eserine. Addition of 1 per cent solution of doryl in equal proportion of ½ per cent solution of eserine has a more prolonged effect in glaucomatous cases. The use of doryl by intramuscular injection is also a reliable addition to our armamentarium. The efficacy of heparin in the thrombosis of the central renal vein is an encouraging thing in the treatment of acute glaucoma, because these patients show a diminished coagulation time. Aminoglaucosan has been tried in acute glaucoma but its action is transitory and uncertain.

If after a couple of hours of the above treatment there is no improvement in tension iridectomy should be done—a broad glaucoma iridectomy. This is a very difficult task in the acutely congested eye under tension. Retrobulbar injection of novocain through paralysis of ciliary ganglion, perhaps by abolition of excess of sympathetic irritation, helps to lower intra-ocular tension and must be carried out before doing glaucoma iridectomy. In cases where the anterior chamber is extremely shallow the classical iridectomy is very difficult and dangerous, as the lens or the back of the cornea may be injured, and this is apt to be followed by a small prolapse of the iris and even at its best by a certain amount of astigmatism afterwards. *Trap-door iridectomy* short circuits these difficulties. The operation is performed like the ordinary corneo-scleral trephining, except that the disc is not removed but allowed to remain connected by its upper edge, as if through a hinge. The prolapsed iris is snipped off and the disc replaced. The surface of the sclera is smoothed down and the flap sutured in place. The advantages of this operation are the following :—

1. No possibility of wounding the lens or the cornea.
2. The iris is detached from its peripheral attachment.
3. No post-operative astigmatism.
4. Any prolapse occurring is well covered by the conjunctiva and Tenon's capsule.
5. Majority of cases get a permanent filtration.

Another useful operation in acute glaucoma is iridencleisis (for technique *see* under chronic glaucoma). If the anterior chamber is not very shallow in congestive glaucoma, iridencleisis is more effective than a classical iridectomy. While doing any of these operations in acute glaucoma one must make sure about the condition of the lachrymal sac. If there is lachrymal mucocele the canaliculi may be ligatured or the puncta cauterized. Tension sometimes continues to be high in acute glaucoma after operation. In these cases a trial with lævoglaucosan may be given before another operation is undertaken. A word of caution should be given against the continuous use of lævoglaucosan for any length of time. It should not be used continuously without interruption and preferably not without any control, particularly in very old persons, for fear of necrosis. Hamburger recommends glaucosan massage of the eye instead of instillation of drops whereby dilatation of the pupil to maximum is prevented. He reports that since adoption of this method instead of drops, he has never seen any acute rise of tension. The steps of glaucosan massage are as follows :—

1. Apply before noon so as to have plenty of time for observation.
2. The pupil should be at maximum contraction having been treated with eserine already at least 30 minutes previously before massage.
3. Anæsthetise with a drop of procain.
4. Apply glaucosan massage with a probe having a cotton-wool wadding at its end and take care that no glaucosan runs into the conjunctival sac. The massage should be applied to a spot near the limbus for 10 seconds.
5. If the pupil does not react sufficiently, repeat massage after 20 to 30 minutes.
6. One and a half to two hours after glaucosan massage instil eserine.
7. Patient must not be allowed to go away until pupil begins to contract.
8. Never treat both the eyes at one sitting.
9. Always treat the more affected eye first. Massage can be repeated next day.

(*b*) *Chronic glaucoma*

Ætiology.—In this condition, symptoms are sometimes completely absent till loss of visual activity and fields of vision are extreme. The rise of intra-ocular tension, which is such an important feature of acute glaucoma, is not a marked and constant feature. It resembles acute glaucoma in the presence of optic atrophy with cupping of the disc and the nasal step of Roenne in the visual fields. The fundamental and underlying cause is the defective circulation. Even such facts as optic atrophy are believed to be due to this cause producing ischæmia through the artery supplying the retina and optic nerve or to functional ischæmia in which there is impairment of velocity of the blood flow leading to inadequate outflow of toxic products. This leads to toxic degeneration without inflammatory reaction, mostly marked in the temporal part of the optic nerve and the retina, where, due to overcrowding of the nerve fibres, even a low grade œdema will lead to a great deal of pressure effect. In a case of chronic glaucoma the optic nerve is seen to be shrunken. Pressure from inside the eye cannot produce this picture. In fact it will lead to thickening of the nerve behind the lamina cribrosa. Diminution of light sense also favours the theory of insufficiency of choroidal circulation in early phases. In contrast to acute

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glaucoma, emotional changes leading to sympathetic-parasympathetic imbalance, hormone instability and peripheral influences do not play such an important part as arteriosclerosis and venous endothelial thickening. Hence, while the incidence of acute glaucoma is greater in women, the incidence of chronic glaucoma is almost the same in both sexes—perhaps somewhat higher in males. It also explains the progress of optic atrophy, in spite of lowering of intraocular tension by eserine in cases of chronic glaucoma. The cupping of the optic nerve is the recession of the lamina cribrosa probably resulting from ischæmic degeneration of the sclera from arteriosclerosis. The correction of underlying circulatory disorders, the removal of any septic foci in the nose, teeth and tonsils and the abolition of any painful reflexes have an important place in the disease. In contrast to the ordinary primary glaucoma, stands out the glaucoma in epidemic dropsy. In this there is never any evidence of inflammation and the two outstanding features are the vasodilatation of the whole capillary system and an increased permeability of the capillary endothelium. In the eye, microscopic examination of the filtration angle shows that the canal of Schlemm and the tissues in the immediate vicinity do not show any abnormality either in cellularity or in increased fibrosis. Increased dilatation of the blood tissues is seen in the subepithelial tissues of the ciliary processes. There is also dilatation of the capillaries of the choroid. One prevalent opinion is that the disease is due to the ingestion of diseased, stored or parboiled rice as the patient recovers quickly on the stoppage of rice in early cases. Relapses occur quickly even when healthy rice is eaten again, suggesting that the infection of the rice occurs in the intestines. In this variety of glaucoma there is high tension in both eyes which cannot be lowered by miotics. The anterior chamber is narrow or deep and there is absence of any inflammation. Corneo-scleral trephing has to be done. It has been abundantly discussed that glaucoma is not a disease *sui generis* and the importance of extra-ocular influences like diminution of calcium content of the blood, the changes in capillaries leading to the increased permeability, the influence of the sympathetic in the control of size of blood vessels of the ciliary body and the choroid, by automatically causing their contraction to prevent filling, and the influence of hormonal secretions of the adrenals, the thyroid and the pituitary have all been mentioned. A few other factors concerning extra ocular-influences are worth mentioning, *viz,* that in glaucomatous cases, while there is a rise of calcium salts in the blood, there is decrease of potassium and chlorides; there is increase of red cells in blood and the large mononuclears have been found to have increased as much as 15, 20 or even 30 per cent. According to Wright, the toxins in circulation in these cases interfere with the function of the reticulo-endothelial system. Of the endocrine changes, marked increase of folliculin in urine, in correspondence with the increase of intra-ocular tension, is a point of interest.

Treatment of chronic glaucoma.—On the basis that toxæmia is one of the underlying causes it is justifiable to try elimination of toxins by conservative methods, *e.g.*, rest in bed, restricted diet, free intestinal action, diaphoresis and action of kidneys. This explains the beneficial results of intravenous hypertonic saline, concentrated glucose injections and the benefit from such drugs as adrenalin and ergotine. Irradiation of the body does good by acting on the vegetative nervous system and irradiation of the thyroid has led to improvement of vision and visual fields. Insulin has also been made use of to produce fall of tension. On the basis that stasis in uveal circulation results in accumulation of toxic metabolites such as carbon dioxide, lactic acid, and choline and increased acidity locally, Fischer and Thomas have succeeded in reducing the tension of glaucoma by giving subconjunctival injections of sodium citrate. Calcium salts by decreasing the permeability of the uveal capillaries have proved to be of benefit in glaucoma. Other conservative measures in the treatment of chronic glaucoma consist of correction of ametropia, giving attention to the allergic states in the vicinity (facial and trigeminal nerves), medication regulating sympathetic imbalance (eserine, salicylates, gardenal or luminal and opotherapy). Also treatment with calcium chloride and iodides and cardiovascular tonics, correction of hyperglycæmia and antiseptic medication. All these measures are highly beneficial provided the action of miotics is never arrested. Ergotamine has proved useful in chronic glaucoma by lowering tension and causing constriction of the pupil and it can be given by mouth. Besides these measures the conservative treatment of chronic glaucoma consists in the prolonged use of 0.5 per cent eserine or 0.25 per cent of pilocarpine once or twice a day. Massage with the finger-tips is also useful. Where diagnosis is uncertain or operation is refused, the above line of treatment is essential. Glaucosan is capable of reducing tension where eserine and pilocarpine have failed. Trial should be given before operation, not by drops but by massage (for method *see* under acute glaucoma). If the circumscribed massage has been well borne, one drop of glaucosan should be put in the eserined eye. After half an hour at least, apply miotics at intervals of 15 to 20 minutes so as to make the pupil narrow again and to maintain the miosis. A great advantage of glaucosan is that it can be used as a mydriatic for fundus examination in suspected glaucoma cases. When the above line of treatment fails and there appears to be some loss of field of vision, operative treatment is unconditionally advised for chronic glaucoma.

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The aim of operative treatment is to provide a filtering channel of some sort. Elliot's corneo-scleral trephining, which is so commonly practised in chronic glaucoma, is uncertain at times in its results and is liable to be complicated by serious changes, both immediate and remote. Rarely, the operation may cause a sudden and complete loss of whatever vision is present in an advanced case. As a prophylactic measure operation in the sound eye is inadvisable, till some contraction of the field of vision occurs, and hence the patient should be kept under observation and the field of vision recorded from time to time. Weak pilocarpine on alternate days may be put in the sound eye as a prophylactic measure, and general regime ordered to avoid cerebral congestion. The essentials of a good operation are :—

1. The filtering channel should be through a permeable cicatrix.
2. The filtration should not be limited to one area, but should be diffused over a wide area.
3. It should be permanent but not excessive, so as to avoid hypotonia.
4. It should not cause excessive trauma and should not be followed by iritis or ciliary injection.
5. The cicatrix, though permeable, must be covered with a layer of conjunctiva, so that the risk of infection to the eye is minimum.
6. The cosmetic effect should be good. Unsightly blebs and lumps must be avoided.

The above being the essential features of a good operation, Elliot's operation is disadvantageous in the following respects :—

1. The operation is followed by considerable injection and even sometimes by frank iritis, for which reason atropine has to be put in after the operation.
2. In a large number of cases ectatic blebs will form at the site of operation, which bulges the eyelid, producing an ugly deformity and it is a constant menace to the integrity of the eye.
3. The development of myopia after operation is common. This gradually passes off but some of it may remain.
4. Late formation of anterior-chamber is not rare and is always a source of anxiety lest it may lead to the development of nuclear cataract.
5. Post-operative cataract developing later on is common; according to Harrison Butler about 10 per cent.
6. Late infection resulting in total loss of the eye has been known to occur.
7. Occasionally the trephined eye becomes hypotonic.

Thus the corneo-scleral trephining, though giving an excellent percentage of good results, sometimes gives very disappointing failures. For these reasons some surgeons prefer iridencleisis. Its advantages are :—

1. It causes less disturbance in the eye and rarely any marked post-operative injection, and post-operative iritis hardly ever occurs. It is never necessary or advisable to use atropine and the patient can leave the hospital and return to work within a week. Trephining takes longer.
2. The ectatic scar is very rarely seen. The pupil, contrary to what one might imagine, is never drawn up.
3. Changes in refraction after iridencleisis is very uncommon. A slight myopia is only transitory.
4. Late formation of anterior chamber is not seen.
5. Post-operative cataract does not occur.
6. Late infection is very rare.
7. Hypotony does not occur. In fact it takes some time before the tension comes down and sometimes massage is necessary.
8. Cases after operation probably show remarkable enlargement of the field of vision, which is not so well marked in trephining. Iridencleisis is as successful in acute glaucoma as in the chronic variety.
9. The dangers of sympathetic ophthalmia and irritation from iris inclusion, as one might anticipate, have proved to be unfounded, because the iris inclusion is well covered, not only by the conjunctiva, but by the Tenon's capsule also. The only real objection to iridencleisis is, that its effect is said to be slow and that if after-care is not taken conscientiously, the filtration will be ineffective. The following statistics (after Harrison Butler) show that iridencleisis is superior to trephining:—

	Iridencleisis	Trephining
Acute glaucoma		
1. Successful ..	83.3 per cent	54 per cent
2. Cataract formation ..	0.0 „	0 „
3. Total loss ..	0.0 „	24 „
Chronic glaucoma		
1. Successful ..	93.2 „	70 „
2. Cataract formation ..	0.0 „	10 „
3. Total loss ..	0.0 „	4 „

Technique of iridencleisis.—No antiseptic is used before operation. A drop of eserine is put in with the first application of cocain, so as to prevent the dilatation of the pupil. Tenon's capsule is picked up with forceps, after making an incision with squint scissors horizontally about 10 mm. above the limbus, it is carried to the sclera and a small pouch is made with a few snips of scissors. The asssitant, picking up the point of the flap, a narrow keratome is placed upon the sclera 3 mm. from the limbus and the flap is dropped over the blade of the knife, which is pushed slowly into the chamber. The point of the keratome is brought to the level of the centre of the cornea and is drawn in a sideways movement to make the opening rectangular. By lifting the flap again, the iris is caught near the sphincter with Matthieu's iris forceps and is half incised with De Wecker's scissors. The flap is smoothed into its place and the operation is complete. No after-treatment is called for.

Lagrange's operation.—The knife required for this operation should be narrow and thin but not flexible. The Nicaty knife is good, but a sclerotome is better. For the right side, the eye is fixed near the limbus at the 7 o'clock position and the knife is held in the right hand. For the left eye it is fixed at 5 o'clock position with the right hand, and the knife held in the left. The scleral portion present at the apex of the irido-corneal angle is about 1 mm. wide and the scleral section must be made at this site. The tissues to be excised should consist only of the sclerotic without any corneal tissue at the base of the flap, since the corneal tissue has a tendency to proliferate and may obstruct the scleral orifice. The ciliary body must not be injured. The incision must not be so wide as to permit the escape of the vitreous. In operation for the left eye the puncture should be made at the 1 o'clock position about 2 mm. behind the limbus, and the tip directed towards the anterior chamber towards the centre of the pupillary orifice. The knife is stopped as soon as the tip is visible in the irido-corneal angle and can work freely there. The knife is now turned so that its flat surface is on the iris while the edge is at the bottom of the irido-corneal angle, which it gently touches and the knife is pushed in so as to make a counter-puncture at a point symmetrical with that where the original puncture was made. The scleral flap is formed by slightly sawing movements. The scleral wound now gapes, its lower lip constituting the apex of the flap whose height was determined by the position of the puncture. Now form the conjunctival flap and lift it up with an iris forceps so as to dissect beneath it a fragment of the sclerotic in a direction parallel to the limbus with a modified Vaucher's punch. The

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sclerotomy thus performed is completed by a peripheral or total iridectomy. Iridectomy can be performed simultaneously with sclerectomy by the punch forceps. The operation succeeds in about 85 per cent of cases of chronic glaucoma, while in ordinary glaucoma iridectomy there is only an average of about 25 to 30 successful cases per hundred. Operative accidents are negligible. There is no risk of early or late infection. The 10 to 15 per cent of failures are due to lesions of the blood vessels of the retina or in the optic nerve, whose degeneration cannot be arrested by any means.

High-frequency current.—This has the effect of lowering the tension in nearly all moderately hypertensive eyes. The method should not be utilized in inflammatory cases and the application should not be longer than 1 to 4 minutes, and although the effect is more or less transitory, the application does good in the long run. In order to avoid startling the patient the current should not be turned on until contact has been made with the skin.

Cyclodiathermy puncture in glaucoma.—This is a valuable anti-glaucoma operation. It is free from such dangers as sympathetic ophthalmia and panophthalmitis. The method is particularly useful where iridectomy and the operations for subconjunctival filtration have failed. It is of particularly great use in malignant forms of glaucoma where the anterior chamber has disappeared, also in ineffective iridectomy and trephining. No operation from iridectomy up to iridencleisis and sclerotomy has been possible up till now without the presence of an anterior chamber. The danger of this method lies to the cornea and the lens in particular. The diathermy needle should not be brought closer than 2½ mm. from the limbus. The needle under no circumstances should be longer than 0.5 mm. from its point to the stop. In aphkic cases it may be 1 mm. long. A hyperæmic iris and increased opaqueness of the anterior chamber follow one to two days after the operation. It is important to set up a slight lesion of the vitreous without injuring it too much. The punctures are numerous. A cyclodiathermy puncture which begins 2½ mm. from the limbus and reaches 4 to 5 mm. behind, lies over the ciliary body and goes up to the ora serrata. Mention must be made of the possibility of necrosis of the sclera. As many as 100 to 200 punctures have to be made in the area of an arc 3 mm. behind the limbus, running from the medial to the lateral rectus. The eye is very hypotonic after the operation. Sometimes it takes several days.

Finally, in the treatment of chronic glaucoma glaucosan must be tried in cases unsuccessfully operated upon, before trying other operations, at first cautiously and then once or twice a week. Some use it as frequently as two to three times a day alternately with miotics.

Absolute glaucoma

Sooner or later tension in the glaucomatous eye becomes normal or even diminished and the condition passes into a state of absolute glaucoma due either to the stretching of the walls or degeneration of the ciliary body. Such an eye may even shrink, but more commonly ulceration of the cornea occurs. Hypopyon ulcer, panophthalmitis, and phthisis bulbi are the fate of such eyes ultimately. In absolute glaucoma pain is best relieved by hot bathing and aspirin internally. It is advisable to excise such an eye since there is always a risk that the cause of glaucoma may be intra-ocular growth, usually a sarcoma of the choroid which may be left behind if the eye is not excised.

2. SECONDARY GLAUCOMA

Ætiology. (*i*) *Trauma.*—This may cause intra-ocular hæmorrhage or perforation of the cornea. The intra-ocular hæmorrhage by pushing the lens and the iris forwards causes anti-synechia and by increasing the viscosity of lymph and blocking the canal of Schlemm by the blood cells leads to obstruction in the outflow. In perforating injuries, anterior synechia cause narrowing of the angle of filtration and thereby the increased tension. The synechia may not be of the iris alone but of the lens capsule. These synechiæ push forward the iris, causing obliteration of the angle.

(*ii*) *Uveitis.*—Plastic iritis leads to annular posterior synechia which prevents the escape of aqueous into the anterior chamber, and pushing the iris forwards—iris bombé—leads to obliteration of the angle, causing rise of tension. The obstructed lymph behind an annular synechia causes pressure-atrophy of the ciliary processes, which ultimately causes a fall of tension in the eye. The inflammatory process, by formation of a layer of exudate behind and between the fibres of the suspensory ligament of the lens, prevents the exchange of fluids between the aqueous and the vitreous, leading to increased tension.

(*iii*) *Cataract extraction, wounds of the lens and discission.*—In cataract extraction and wounds of the lens, the capsule may get incarcerated in the corneal wound, and by pushing forward the iris will lead to obliteration of the angle. The lens particles, by increasing the albuminous contents of the aqueous, further lead to obstruction of outflow, thereby causing increased tension. In discission the vitreous may get into the anterior chamber, causing obstruction to the outflow and thereby increased tension. After cataract operation, the edges of the wound may not unite well and the epithelium advancing inwards may line the anterior chamber and thus shut off the canal of Schlemm.

(*iv*) *Thrombosis of the central retinal vein.*—By causing hæmorrhage in the eye and pushing the vitreous, the lens and the iris forwards and by increasing the viscosity of the lymph by the additional albuminous content cause restriction to the outflow of aqueous and hence increased tension.

(*v*) *Dislocation of the lens.*—If complete into the anterior chamber, the tightly-contracted iris behind it obliterates the angle. If partially

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dislocated, it pushes the iris in front of it and causes obliteration of the corresponding portion of the angle and increase of tension.

(vi) Intra-ocular tumours.—The factors which caused increased tension work not by the increase of volume only and the distension of the eye so much as by the position of the tumour. Those in the anterior half of the globe raise the tension more than those more posteriorly, by impeding the venous return by encroachment on the ciliary body and the vorticose veins as well as pressure on the filtration angle. With obstruction to the capillary and the venous return, secondary changes in the form of perivascular infiltration by small white cells play an important part. Eyes removed for the tumours show that those in which there is perivascular infiltration, particularly of the anterior ciliary vessels, have shown an increased tension while those in which in spite of large intra-ocular growths there was no perivascular infiltration, particularly of the anterior ciliary veins, showed no increased tension during life. Hence perivascular infiltration, particularly of the anterior ciliary veins, is an important cause of rise of tension. Cycloplegia, serpent ulcers by causing iritis and annular posterior synechia, and radium therapy have also been known to give rise to secondary glaucoma.

Treatment of secondary glaucoma.—In cases due to injuries, the treatment varies in different cases, *e.g.*, in a case of hæmorrhage in the anterior chamber, irrigation through a keratome incision and the use of some tension-lowering agent, *e.g.*, 50 per cent sorbitol intravenously, proves useful. In cases of secondary glaucoma due to a swollen traumatic cataract, solution of gum acacia intravenously and miotics for several days, followed by expression of the cortex give good results. In cases of injury look for rise of tension, and when it occurs the use of miotics is desirable in some cases, while in others paracentesis or iridectomy is better. In hæmorrhage in the anterior chamber, if atropine is used, be on the look out for rise of tension. In cases of tension going dangerously high, in cases of iritis, a continuous use of miotics must be made and as soon as the tension falls use mydriatics. In cases in which tension could not be controlled by miotics, or their use was considered undesirable on account of plastic exudates, use of intravenous hypertonic solutions—100 c.cm. of 50 per cent dextrose or an equal amount of 50 per cent sorbitol or 150 to 200 c.cm. of 10 per cent salt solution—has given good results in reducing the tension. Instillation of a combination of 20 per cent solution of mecholyl, a derivative of choline, with a 5 per cent solution of prostamine has given good results, where miotics and epinephrine have failed. In secondary glaucoma cyclo-diathermy puncture is of use, when simple iridectomy has not proved enough. Iritis is no contra-indication to it. Cyclo-diathermy puncture may also be attempted in glaucoma hæmorrhagicum, *e.g.*, after obstruction to the central retinal vein. In secondary glaucoma, due to adhesions of the iris to the lens capsule after cataract operation, glaucosan may be tried; it is also useful in breaking up the adhesions of the iris to the lens capsule in secondary glaucoma due to iritis, short-wave and diathermy therapy also hold out useful prospects of benefit in cases of iridocyclitis with secondary glaucoma. Where all these methods have failed in secondary glaucoma after extra-capsular cataract extraction and discission, cyclodialysis is a useful operation. There is no danger of presentation of the vitreous; the pillars of the iris and the tags of the capsule can be separated from the scar by the spatula, and the lymph-channel created by the separation is likely to remain open. It can be repeated in other quadrants if necessary.

Technique of cyclodialysis.—Fixation is made with a Gifford's fixation forceps on the tendon of the superior rectus, and maintained right up to the close of the operation. The incision is made 7.5 mm. behind the limbus, between the superior rectus and either of the horizontal recti, and is made to the inner or the outer side according to which pillar appears adherent. The incision is made bevelled at an angle of 45 degrees, a fine suture through the sclerotic tongue is put on through a Kalt needle. The incision through the sclera must be extended through a length of 3 to 4 mm. so as to allow free play to the spatula. After this with a Holth punch, a semi-oval button about 3 mm. is excised from the scleral tongue. A narrow spatula is introduced through here hugging the sclera and is directed into the area of the coloboma. Both pillars and an area of iris root to the extent of one quarter of the corneal circumference are freed, and the sclera for several millimetres around the incision is also undermined. A running suture closes the conjunctival incision.

After the operation, a 0.5 per cent eserine solution is continued so as to prevent adhesions of the iris root to the sclera, except in cases of marked hæmorrhage in the anterior chamber. In these cases employ homatropine or neosynephrine. Both these drugs should be replaced by miotics as soon as the blood is absorbed. Miotics should be discontinued if acute hypotonia occurs. In cases of secondary glaucoma occurring after uveitis, iridectomy is the operation of choice, and in those following cataract extraction and discission, cyclodialysis.

BIBLIOGRAPHY

BURNHAM, G. H. (1934). Primary Glaucoma: Respective Values of Different Forms of Treatment of this Disease. *Brit. J. Ophthalmol.*, **18**, 687.

BUTLER, T. H. (1932) .. Iridencleisis and Trap-door Iridectomy in Treatment of Glaucoma. *Ibid.*, **16**, 741.

DUKE-ELDER, S. (1934). *Recent Advances in Ophthalmology*. P. Blakiston's Son and Co., Philadelphia.

DUKE-ELDER, W. S., DUKE-ELDER, P. M., and COLLE, J. C. (1932). Effect of Adrenalin on Intra-ocular Pressure and Its Clinical Significance. *Brit. J. Ophthalmol.*, **16**, 87.

EVANS, P. J. (1939) .. Underlying Causes of Glaucoma. *Ibid.*, **23**, 745.

GIFFORD, S. R. (1940) .. Treatment of Secondary Glaucoma. *Arch. Ophthalmol.*, **23**, 301.

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HAGEN, S. (1937) .. Norwegian Contribution to the Diagnosis and Treatment of Glaucoma. *Brit. J. Ophthalmol.*, **21**, 597.

HAMBURGER, C. (1935) .. Experiences with Glaucosan. *Ibid.*, **19**, 455.

Idem (1939) .. Treatment with 'Glaucosan' of Cases of Glaucoma Operated upon unsuccessfully and of Complicated Cataracts. *Ibid.*, **23**, 557.

KIRWAN, E. O'G. (1936). Ætiology of Primary Chronic Glaucoma. *Brit. J. Ophthalmol.*, **20**, 321.

LAGRANGE, H. (1937) .. Surgical Treatment of Chronic Glaucomatous Hypertension. *Ibid.*, **21**, 477.

MADDOX, E. E. (1933) .. Clinical Note on Glaucoma. *Ibid.*, **17**, 161.

MASSOUD, F. (1937) .. Extra-Ocular Influence in Glaucoma. *Ibid.*, **21**, 559.

Medical News

INDIAN EUGENICS SOCIETY

IN presenting the first Bulletin of the Indian Eugenics Society which includes a paper on 'Aims and Objects of Eugenic Researches in Bengal' by S. S. Sarkar, Dr. B. K. Chatterjee, the president of the society, writes as follows:—

Ten years ago, a handful of research workers were thrown together in the Indian Museum, Calcutta, and the little time they could snatch away from their daily work was devoted to discussions of various problems of Indian life and society—race, history, demography, etc. The new science of Eugenics featured largely in these discussions.

Looking back in time we feel that the profound disillusionment characteristics of the decennium, has much to do with the birth of the eugenic idea in our minds.

For a century the people of Bengal had set their hopes upon Modern Education as the means of initiating a renaissance in the country. They had hopes to have much from the new spirit of politics, from social reforms, from religious revivals, from the growth of individualism and what not! There were wide differences of opinions on almost all points at issue. There was no lack of dreamers who worked, suffered and sacrificed for the realization of their dreams and there was a secret illusion in the hearts of many that our people had marched a few steps towards strength and modernization.

By the early thirties of the present century, when the idea of an eugenic movement took shape in our minds, however, the hopes of a hundred years had been shattered. It could no longer be ignored that we were wanting in what were vitally necessary not only for our survival, but also for our emergence as a modern nation.

The founders of the society concentrated themselves not only in the laboratory but also lived in society, in association with common men and women whose qualitative characters ultimately determine the fitness of a people to survive. Experience thus gathered from day to day in direct contact with the people led them to put the question—are our physical and mental powers, our moral calibre adequate for us to survive in the struggle for existence? If not, could these same powers be enhanced and our moral and intellectual calibre strengthened so that our people may purchase a new lease of life?

These questions cannot be answered by a simple yea or nay, for they are concerned with the complicated phenomena governed by multiple factors. If in some parts of India the physique of the population was poor, how far was it attributable to race and constitution and to what extent were malnutrition and climatic influences responsible for the same? How does it affect the psyche of the people? And—come to think of it, are not the nature of the social organization in India, the family life, the relations of the sexes, in short, our social *milieu* responsible for much in our mental equipments which have led to our failure in the past? Was the individualistic outlook of our philosophies, in so far it had become a mental habit of the population, also not one of the factors which ultimately led to our collapse?

While we were by no means inclined to underestimate the effects of such environmental factors on our character, we felt that the crux of the matter lay in the nature of the stocks which constitute our population. These stocks could be classified into several zoological races, more or less evolved. They embrace families, which contribute to the generations, who by the reactions of their various potentialities, shape the history of the people! The fundamental question which we eugenists have to deal with, is, therefore, one that concerns mainly our potential capabilities, their character and the degree in which they are distributed in our population. The question has to be put—however unpleasant and however inconsistent with the prevalent democratic notions—how have these inherent potentialities been affected by miscegenation with the more primitive races who constitute by no means a negligible percentage of the population of India? We must also ask—in what way have the various historical forces, operating through centuries, selected or eliminated the the more or less desirable qualities of our population, so that they are to-day what they are! Is it possible, for example, that the nobler and more altruistic characters have been eliminated in course of age-long conflict with foreign conquerors, *e.g.*, Saks, Huns and others? Is it possible that hereditary defects of body and mind have accumulated in the population owing to lack of caution in sexual selection and, in general, a heedless attitude on questions of racial hygiene? Ten years ago we began asking ourselves these questions, and we have never ceased asking them!

The answer to such questions depended obviously upon our ability to undertake expensive research work, multifarious in nature and embracing a vast tract of country. This we were not in a position to undertake. For the first four years of the decennium all that we could do was to write short articles in the Bengali press, in an attempt to popularize the different aspects of eugenics and problems of heredity.

The later part of the decennium, however, found some of us in Europe, where eugenic ideas are more or less popular and eugenic laws are in actual operation in certain countries. From the results of the operation of the eugenic laws and state measures—calculated to improve the stocks in question—in Europe, we keenly felt the need to found this society, which, we hope, may some day inaugurate a powerful eugenic movement in this country.

MADRAS MEDICAL COUNCIL

REGISTERED medical practitioners who own registration certificates with the number given below are requested to forward their certificates without delay to the Registrar, Madras Medical Council, 79-81, Mount Road, Cathedral P. O., Madras, for verification and return, as the records referring to these numbers are not traceable in the office. If no reply is received by the 15th March, 1942, it would be taken for granted that

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registration certificates bearing these numbers were not issued at all:—

5178; 5189; 5190; 5193; 5194; 5195; 5196; 5197; 5198; 5203; 5204; 5205; 5206; 5207; 5208; 6427.

Registrar,
Madras Medical Council.

YELLOW FEVER DANGER TO INDIA

THE danger to India of the introduction of yellow fever considerably increased with the outbreak of the war. Necessary defensive measures have been planned which have so far kept India free from this danger.

Among the measures taken was the promulgation of the Indian Aircraft (Public Health) Emergency Rules, which laid down that no yellow fever-infected aircraft should land, on entry into India, at any other place than Karachi Air Port in the case of land planes and Karachi Marine Air Port in the case of sea-planes. They also provided for the isolation and observation in the mosquito-proof isolation hospital of persons suffering from or suspected to be suffering from yellow fever as well as of uninoculated persons who had been exposed to infection. Measures against the introduction of yellow fever by sea traffic are under consideration.

Sufficient stocks of yellow fever vaccine for inoculation have been obtained from the Rockefeller Foundation of New York and the Wellcome Bureau, London. They are kept in cold storage at the Central Research Institute, Kasauli, the Haffkine Institute, Bombay, the King Institute, Guindy, the Provincial Public Health Laboratory, New Delhi, and at the School of Tropical Medicine, Calcutta, and facilities for inoculation now exist in these places.

In the event of yellow fever being introduced into India and sufficient stocks of vaccines not being available for New York or London, the necessity of manufacturing the vaccine in this country has been noted. Arrangements have been made to send an experienced officer of the Medical Research Department to the United States for training under the Rockefeller Foundation in the manufacture of this vaccine.

Inoculations have been done at Delhi of officers and staff of the Government of India who would have to deal with a yellow fever outbreak and it has been decided to inoculate those persons at the ports of Bombay and Karachi who are likely to have dealings with a ship or aircraft infected with yellow fever.

STEPS TO PREVENT MILK ADULTERATION

BOTH from economic and public health points of view, the Indian dairy industry is of considerable importance to the country and deserves a lot more attention than it has received in the past. This conclusion is stressed by the Agricultural Marketing Adviser to the Government of India, in summarizing his recommendations in an abridged edition of his Report on the Marketing of Milk in India and Burma.

This abridged edition has been published to aid producers, consumers and those interested in social or economic uplift to appreciate problems relating to the supply and distribution of milk.

To a people whose diet is deficient in first-class proteins, milk is vitally important, because it furnishes these proteins. The Agricultural Marketing Adviser urges the need to stimulate the consumption of fluid milk, for in this way all the nutritive constituents of milk are best assimilated. In order to stop the adulteration with imported skimmed milk powder the Report proposes the levy of a prohibitive import duty on this product; revision of the present standards of purity, which are very lax; the abolition of 'mixed' standards, and more vigilant enforcement of the Food Adulteration Acts by municipal authorities.

A scheme is suggested for the reorganization of milk distribution and marketing in towns and cities, by the creation of a form of an authorized marketing organization, which would protect the interests of producers, distributors and consumers.

OCCUPATIONAL THERAPY

LONDON doctors are to-day prescribing embroidery for soldiers with nervous trouble.

Knitting, explains Lady Smith-Dorrien, head of the Royal School of Needlework, is not enough to take the mind off worry.

Many women have written to her complaining that they have knitted and knitted until they can knit no longer and asking her for the best work to take up the entire attention.

To all of them Lady Smith-Dorrien recommends fine embroidery, intricate and difficult work which wholly occupies the mind.

The same principle is now being applied to the new methods in Britain's war-time hospitals. Mere amusement is not enough: the patient must be given an occupation that is difficult. Thus the needle, so long employed for putting something into him, is now being used, and with excellent results, in getting his worries out.

The Queen is so interested in the departure that when she found a soldier embroidering his regimental badge in a Red Cross hospital she asked for a sample of his work.

DEVELOPMENT OF NURSING SERVICE IN INDIA

A SURVEY of nursing in India is to be carried out by means of a questionnaire issued to government departments, local authorities, voluntary hospitals, organizations of various kinds and to individuals interested in the training and conditions of service of nurses.

This survey will provide much valuable information on which to base recommendations for the development of a sound nursing service in India.

The number of registered nurses in India is approximately 5,000 against a total of 40,000 registered doctors. It is felt that a reversed proportion of nurses and doctors would be more in keeping with the duties which each profession has to perform.

Shortage of staff

One of the reasons why more hospitals in India do not train nurses is the shortage of an adequately qualified administrative and teaching staff. Rapid progress can only be made if facilities for post-graduate study are provided in India for nurses who have shown special ability and aptitude for administrative or teaching posts.

While the proposal has the general support of provincial medical departments and various non-official nursing and medical organizations, the extent to which provincial governments will be prepared to support the school by sending students for training and later by absorbing them into their nursing services is still to be explored. This information when obtained will be of the greatest help in formulating concrete proposals for the establishment of an All-India Post-Graduate Nursing School.

In order to secure uniformity of aims and standards throughout India and to facilitate inter-provincial reciprocity in the recognition and registration of nursing certificates, the establishment of a Central Nursing Council has been recommended by the Central Advisory Board of Health.

THERAPEUTIC RESEARCH CORPORATION OF GREAT BRITAIN, LTD.

THE formation of the T.R.C. constitutes the most important step yet taken in the rationalization of the

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British Fine Chemical industry. It is the rationalization of research in matters of common interest; in other words, truly basic rationalization to which will be added in due course, where desirable, a further measure of rationalization of production facilities compatible with national security.

It must be emphasized that the T.R.C. is *not* a merger or amalgamation of the companies concerned, each of which retains complete freedom of action in its special fields and, while contributing to a common research pool, forfeits none of its special characteristics.

Each of the five companies now participating in a joint scheme of research has over a long period of time carried out extensive scientific research which has been of great value to humanity. This work has, however, been conducted on individualistic lines which will not apply to work undertaken by the corporation. Any new drugs which may be discovered by the corporation will not be monopolized by any one company.

Many possible advantages of this new collaboration to medical science, as well as to the British pharmaceutical industry, can be readily foreseen. Increasing specialization of scientific technique tends more and more to call for men with long experience in particular methods; it also often calls for complicated and expensive equipment for its execution. The rapidly advancing volume of knowledge concerning the varied aspects of disease is now so great that to attain a full grasp of any one problem calls for a team of specialists in order that knowledge in these fields may be further extended. These may be accounted among the many advantages that may result from this scheme of co-ordinated research and unified effort in the exploration and solution of selected problems. Greater thoroughness and higher speed of investigation should result and much wasteful overlap should be eliminated.

There has existed in the past a diffidence on the part of some academic research workers in this country to ally themselves wholeheartedly with the researches of industrial firms. The seeds of such an alliance have nevertheless been sown during the past decade. The new corporation should be able to achieve much in fertilizing this growth by further breaking down the barriers and by establishing closer liaison between industry and the research laboratories of the universities.

Clearly, the corporation will have in the various chemical, physiological and bacteriological laboratories at their command the choice of many different lines of approach to their problems and the call on the extensive scientific personnel and equipment of the five companies. This should make for a hopeful start and lay the foundation of a promising superstructure.

The five companies concerned in this research corporation are:—

Boots Pure Drug Company, Limited.
The British Drug Houses Limited.
Glaxo Laboratories Limited.
May and Baker Limited.
The Wellcome Foundation Limited.

MESSING OF BRITISH AND INDIAN TROOPS INCREASE IN ALLOWANCE

AN increase in the messing allowance of both British and Indian troops was made in 1940.

With the increase in the messing allowance for British troops, a great majority of the British units have been able to provide an excellent and ample dietary for their personnel without making any charge for extra messing. Messing was maintained at a satisfactory level in spite of rising prices of imported foodstuffs. The present rations *plus* the commuted rations and the messing allowance are considered quite sufficient to provide the soldier with an attractive diet of adequate caloric value.

The messing allowance for Indian troops has been increased to Rs. 2 per mensem. It is calculated that in a well-organized unit the daily nett value of the food eaten by an Indian sepoy is now over 3,500 calories.

The issue of a pint of milk daily to each recruit of training battalions and similar units, at least for the first month of training, is under consideration.

HEALTH OF CIVIL POPULATION

IMPORTANT problems relating to the health of the civil population were discussed at the fourth meeting of the Central Advisory Board of Health held in Calcutta on 26th, 27th and 28th January, 1942. The Hon'ble Mr. N. R. Sarkar, Member for Education, Health and Lands, Government of India, presided.

Two important subjects discussed at the meeting were the reports of two special committees on 'Leprosy and its control in India' and 'Medical Inspection of school children and the teaching of hygiene in schools'. The Board commented on the reports and made suitable recommendations.

Among other subjects discussed at the meeting were the control of cholera epidemics, provision of rural water supplies, the formation of an All-India Nursing Council and the provision of post-graduate training for nurses and the control of malaria in rural areas.

Anti-leprosy work

The Board, in commending the report on leprosy and its control for detailed consideration by Provincial and State Governments, expressed the hope that the recommendations would materially assist the Governments in the formulation and execution of a co-ordinated policy for anti-leprosy work, with special emphasis on the preventive aspect of the problem.

Any real progress in anti-leprosy work, it was stated, would require the co-operation of the public and particularly of medical men. For this a more enlightened attitude to leprosy and those suffering from it was essential. The Board recommended that wide publicity should be given to the report in the Provinces and States, preferably in the languages spoken by the peoples.

Anti-cholera work

Research carried out by the Indian Research Fund Association has established that cholera infection is permanently present only in certain restricted areas and that it spreads from such areas into other parts of India. The Board, therefore, suggested that a concentrated scheme of sanitary improvements in these endemic areas of cholera should prove to be the most effective method of controlling the spread of the disease. The provision of safe water supplies and an improvement of conservancy to prevent fly breeding are the most important steps to be undertaken by the health authorities.

COCAINÆ HYDROCHLORIDUM

OWING to the extreme difficulty in obtaining supplies of cocainæ hydrochloridum it is imperative that stocks in hand should be conserved to the utmost possible extent. This drug is imported in the crude state from South America to the United Kingdom where it is refined and despatched overseas. The purchase of cocaine involves therefore much foreign exchange.

ATROPINÆ SULPHAS

OWING to the extreme difficulty in obtaining supplies of atropinæ sulphas it is imperative that stocks of this drug should be conserved to the utmost possible extent. As far as possible its use should be restricted to ophthalmic practice and replaced by tinctura belladonnæ, B.P., wherever practicable.

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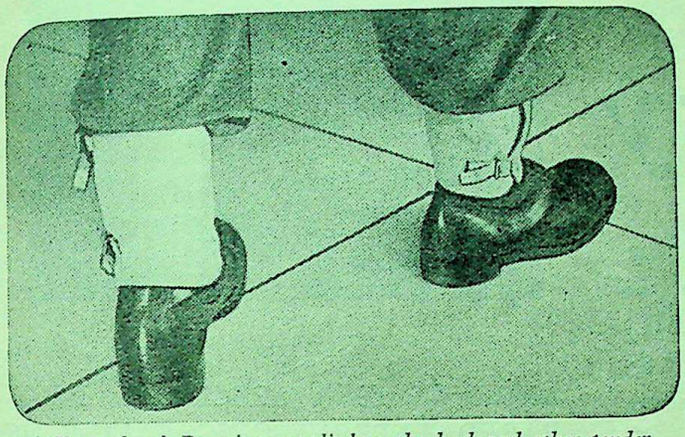
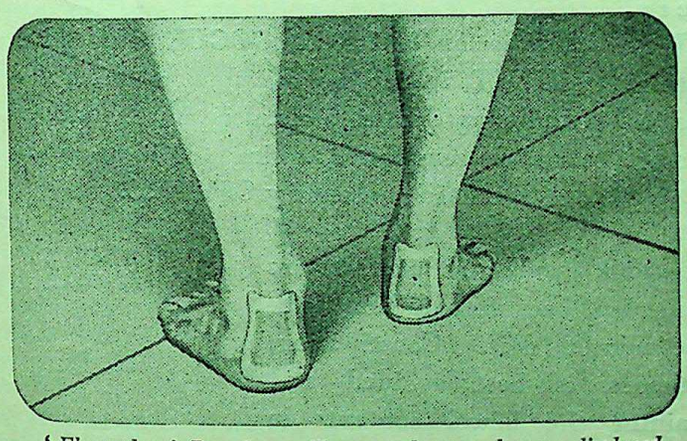
E.D.6.

Increased incidence of minor wounds



'Elastoplast' Dressings applied to the heel and other tender parts of the foot prevent blisters.



'Elastoplast' Dressings will not ruck up or become displaced in wear.

The incapacitation often resulting from sore heels and toes can be averted by the application of an 'Elastoplast' Dressing. 'Elastoplast' Wound Dressings comprise an antiseptic pad of gauze medicated with Bismuth Subgallate on the elastic adhesive 'Elastoplast' base. The 'Elastoplast' Doctor's set contains 106 'Elastoplast' Dressings in various sizes.

Elastoplast

TRADE MARK BRAND

WOUND DRESSINGS

Despite war conditions it is expected that reasonable supplies will be maintained.

Distributors:—

INDIA: Ralph Paxton, 10, Lall Bazar, Calcutta

BURMA: E. M. De Souza & Co., Rangoon

CEYLON: Cargills Ltd., Colombo.

'Elastoplast' products are made in England by T. J. Smith & Nephew, Ltd., Hull

AS SUPPLIED TO THE GOVERNMENT OF INDIA

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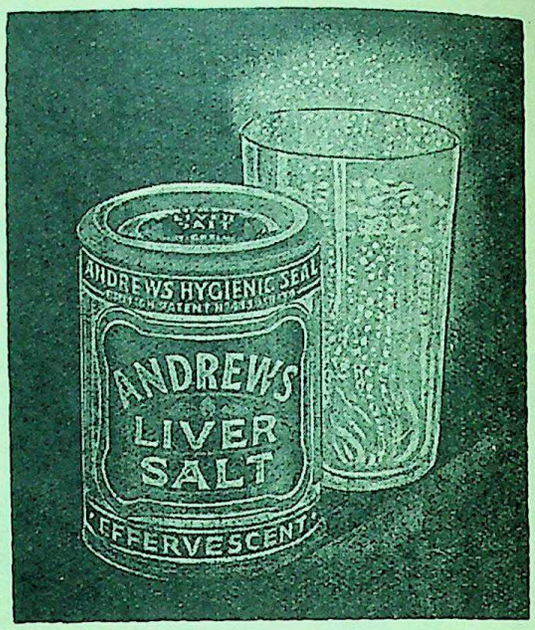
Fatigue and Debility



ANDREWS LIVER SALT is the APERIENT OF CHOICE in all cases of FATIGUE AND DEBILITY whether due to ILLNESS, OVERWORK or WORRY, or consequent upon excess of any kind.

Fatigue is encouraged by constipation, and constipation by fatigue. Severe purges increase fatigue. ANDREWS LIVER SALT is immediately stimulating and refreshing, and, later, produces a feeling of well-being when the system is cleared of poisonous products.

ANDREWS IS A SPECIALLY PREPARED EFFERVESCING SALINE OF PURIFIED AND TESTED INGREDIENTS.

Its action is CHOLAGOGUE and APERIENT, increasing the flow of bile, and inducing gentle peristalsis in the upper and lower bowel, owing to the retention of the fluid content by OSMOSIS.

In tropical countries, bulk producing laxatives are generally contra-indicated, because sufficient bulk is supplied by the normal diet. Constipation, in these circumstances, is best avoided and relieved by maintaining the bowel contents in a fluid condition. For this purpose Andrews Liver Salt gives excellent results.

A large size tin will be sent free, on request, to any member of the Medical Profession. Apply to the Distributors: J. L. Morison, Son & Jones (India) Ltd., P. O. Box 258, Bombay, and Branches.

ANDREWS

LIVER SALT

Scott & Turner Ltd., Newcastle-upon-Tyne, England.

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Public Health Section

A STUDY OF REGISTRATION OF BIRTH AND ITS UTILIZATION FOR PUBLIC HEALTH ADMINISTRATION IN MATERNITY AND CHILD WELFARE

By LEILA GHOSH

and

C. CHANDRA SEKAR

(*All-India Institute of Hygiene and Public Health, Calcutta*)

THE All-India Institute of Hygiene and Public Health, Calcutta, maintains a maternity and child-welfare centre with the object of serving an area, roughly, the northern half of Ward VIII of the city, bounded by College Street on the east, Colootola Street on the south, Chitpur Road on the west, and the Mechuabazar Street on the north. The population of the area is cosmopolitan and is drawn from various parts of India. As judged by the antenatal cases on cards during 1940, the representatives from Bombay Presidency, Rajputana, the Punjab, Bihar and Bengal predominate, their contributions being 19, 17, 15, 15 and 14 per cent, respectively.

Since the inception of the centre in 1933, as a routine procedure, records have been maintained of all infants known to have been born to parents resident in the area and in this paper a part of these records has been utilized to discuss some important problems connected with child-welfare organization.

The aim of a community programme is to contact all infants born in the area shortly after birth and it is recognized that the value of infant-welfare work is greatly reduced if contact with the infant cannot be established within 48 hours of birth. Under the existing procedure at the centre, infants are contacted either through the clinic, the delivery service, the home visiting routines, or by intimation of registration of birth by the registrar of the area. In many countries, contact is effected by enforcing early notification of birth (compulsory within 36 hours in England) to the health authorities, who immediately communicate the information to the visiting health staff concerned. In Calcutta, no such procedure exists, except in the case of maternity institutions, and registration of birth is the only procedure providing official intimation of birth.

The present investigation was undertaken to ascertain how far registration of birth alone can serve the purpose of notification, and, in the main, the discussion relates to :—

(1) The completeness of registration of birth.
(2) The possibility of utilizing registration for early contact.

Registration of birth

On special request, since 1934, the health officer in charge of District II has been supplying once or twice a week, and occasionally at somewhat longer intervals, a list of births registered at the Bagla and Medical College registration offices. Since it is the practice of the Corporation to encourage parents to register births in the registration office serving the ward in which the birth took place, these lists should contain the registered births which occurred to residents in the centre area either at their residence or in institutions situated in the wards served by the two registration offices.

The records of the centre for the four-year period 1936–39 and the list of registered births from the municipal health authorities for the same period were utilized for this study. When the investigation was started it was found that the list of registered births for the year 1936 had been destroyed. With the kind permission of the chief health officer, Calcutta Corporation, copies were made from the records for that year, in the district health office.

To estimate the proportion of births registered, it is necessary to compare the number of registered births with the total number of births. Though, as stated above, only births occurring in the wards served by the registration office should be registered in that office, there is a tendency to effect registration in the office serving the place of residence of the parents. Hence, to obtain a correct picture of the present state of registration, it has been found necessary to divide the known births into three categories :

(1) those which according to place of birth or place of residence of the parents cannot have been registered except in Bagla and Medical College registration offices,
(2) those which occurred in institutions situated in wards not served by the above registration offices, and
(3) those which, due to incompleteness of records, cannot be placed in either of the above groups. (A few births at residences outside the area are also included in this category.)

As there is a time lag between birth and registration, some infants born at the end of the year are registered in the succeeding year. To obtain an estimate of the proportion of registration of births in the different years, it was found essential to pair each registered birth with one in the list of known births compiled at the centre. This was all the more necessary as a preliminary scrutiny of the lists revealed discrepancies in regard to the particulars of registration and it was considered useful to make a note of these.

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The number of known births and of those registered in the different years in each of the categories mentioned above, are as follows :—

Year	Category I Born in the registration area		Category II Born outside registration area (institutional)		Category III Place of birth not known		Total	
	Known births	Registered births	Known births	Registered births	Known births	Registered births	Known births	Registered births
1936 ..	416	222	21	2	19	6	456	230
1937 ..	420	249	31	2	12	2	463	253
1938 ..	451	331	40	4	16	5	507	340
1939 ..	304	194	33	3	12	4	349	201
Total ..	1,591	996	125	11	59	17	1,775	1,024

There was a considerable decrease in the number of known births in 1939 which was due largely to many families, especially Marwaris and Gujrathis, having left for their homes just prior to the declaration of War.

The data in the three categories are of varying interest. The known births in the first category should have been registered in the two registration offices supplying the lists of registered births and the data in that category really provide a proper basis for studying the proportion of registration. The figures in the second category show how far the procedure of registering birth according to the place of birth is violated. Although the births in the second and third categories are not useful for estimating the percentage of total registration, the information supplied by these registered births can be used to assess registration as a means of early infant contact.

Since, as already stated, intimation of registration is at present used as one of the means of contacting infants, it is possible that some of the known births would not have come to the knowledge of the centre staff but for this agency. A comparison of the number of registered births with the number of known births is therefore likely to overestimate the proportion of registration.

The percentage of registration of births occurring in the registration area was 53.4 in 1936, 59.3 in 1937, 73.4 in 1938, and 63.8 in 1939. These percentages differ significantly. During 1936–37 the percentage of registration remained sensibly constant but in 1938 there was a significant increase. In 1939 the percentage fell but was still higher than that during 1936–37. During the four-year period under study 62.6 per cent of known births were registered.

As mentioned above, estimates of the percentage of registration made on the basis of known births exaggerate the figure in favour of registration; it therefore follows that, at most, only 63 per cent of births in the area were registered. Such a state of affairs is far from satisfactory if registration is to be used as the sole means of contacting infants.

Various causes no doubt contribute to the poor registration of births and, if the more important of these are detected, it will make the task easier for the authorities to improve registration figures. For this reason, the effect of certain factors on the percentage of registration was studied. These factors are: (1) the community of the parents, (2) the place of delivery, (3) the agency of delivery, (4) the civic status of the father, and (5) the sex of the infant.

Community.—During the four-year period, except for one birth in 1936, all the known births in the registration area were amongst Hindus and Moslems. The table below gives the number of known births and the percentage of registration for each of these communities :—

Year	Community	Known births	Registered births	Percentage of registration
1936	Hindus ..	233	118	50.6
	Moslems ..	182	104	57.1
1937	Hindus ..	228	128	56.1
	Moslems ..	192	121	63.0
1938	Hindus ..	256	176	68.7
	Moslems ..	195	155	79.5
1939	Hindus ..	171	98	57.3
	Moslems ..	133	96	72.2
	Total ..	1,590	996	..

In all the four years, the percentage of registration was higher amongst the Moslems and significantly so in 1938 and 1939. Although for the whole population the registration in 1939 was poorer than in 1938, the Moslem percentage in these two years was not significantly different, the average value being 76.5. This value is significantly higher than the corresponding one for the years 1936–37, which was only 60.2.

The Hindu percentage of registration also increased in 1938 but fell in 1939 to the level of 1936 and 1937. The percentage of registration in 1938 was 68.7 while the average for the other three years was 54.4.

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There was thus an increase in the percentage of registration both amongst the Hindus and the Moslems in 1938 but in 1939 the latter only maintained the improved standard. The increase in 1938 over that of 1936–37 was proportionately the same for the Moslems as for the Hindus.

Place of birth.—A statement of all known births according to the place of birth, whether at residence or in an institution, is given below :—

	1936	1937	1938	1939	TOTAL
Institution	70	66	83	68	287
Residence ..	378	392	411	272	1,453
Unknown ..	8	5	13	9	35
TOTAL ..	456	463	507	349	1,775

The great majority of births took place in private houses. In the four years considered, only 16.5 per cent of known deliveries were institutional.

The percentage of registration, as effected by place of birth, can be seen from the following figures for known births in the registration area.

It is remarkable that most of the births in institutions went unregistered; whereas nearly 68.1 per cent of births in private houses were registered, the corresponding figure for institutions was only 4.3 per cent. The fact that notification of birth, which is effected in all maternity institutions recognized by the Calcutta Corporation, is by a great proportion of the public mistaken for registration, probably explains the low proportion of registration of institutional births.

If all the births in institutions had been registered in the period under study, the percentage of registration would have been 62.3 in 1936, 65.5 in 1937, 81.6 in 1938 and 74.3 in 1939. It is obvious that steps taken to effect total registration of institutional births would alone increase considerably the proportion of registration.

From the table given below, it is clear that Hindus utilize institutional facilities to a much greater extent than do Muslims, so that the poorer registration of institutional births operates more upon Hindu registration.

It was therefore decided to compare the proportion of registration by communities, for domiciliary births only. The figures over page give the known and registered births occurring at residence within the registration area.

	1936			1937			1938			1939			TOTAL		
	Registered	Total	Percentage	Registered	Total	Percentage	Registered	Total	Percentage	Registered	Total	Percentage	Registered	Total	Percentage
Institution ..	1	38	2.6	2	28	7.1	3	40	7.5	..	32	0.0	6	138	4.3
Residence ..	221	378	58.5	247	392	63.0	328	411	79.8	194	272	71.3	990	1,453	68.1
TOTAL ..	222	416	..	249	420	..	331	451	..	194	304	..	996	1,591	..

	1936			1937			1938			1939			TOTAL		
	Residence	Total	Percentage	Residence	Total	Percentage	Residence	Total	Percentage	Residence	Total	Percentage	Residence	Total	Percentage
Hindus ..	202	233	86.7	205	228	89.9	223	256	87.1	144	171	84.2	774	888	87.2
Moslems ..	175	182	96.2	187	192	97.4	188	195	96.4	128	133	96.2	678	702	96.6
TOTAL ..	377	415	..	392	420	..	411	451	..	272	304	..	1,452	1,590	..

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Births at residence

	1936			1937			1938			1939			TOTAL		
	Registered	Total	Percentage	Registered	Total	Percentage	Registered	Total	Percentage	Registered	Total	Percentage	Registered	Total	Percentage
Hindus ..	118	202	58.4	126	205	61.5	173	223	77.6	98	144	68.1	515	774	66.5
Moslems ..	103	175	58.9	121	187	64.7	155	188	82.4	96	128	75.0	475	678	70.1
TOTAL ..	221	377	..	247	392	..	328	411	..	194	272	..	990	1,452	..

Although the higher proportion of registration by Moslems in all the years was maintained, the difference in each year between the communities was not statistically significant, indicating that the difference originally observed was due to the influence of institutional births.

Agency of delivery.—There is no great disparity in the proportion of registration according to the agency of delivery, be it doctor, midwife or *dai*. For the four-year period 1936–39 the percentage of registration amongst births delivered by doctors was 63.0; the corresponding figures for deliveries by midwives and *dais* were 69.9 and 68.1 per cent, respectively, as can be seen from the figures for deliveries at residence given below :—

Schedule

Category	Occupations included in each category
I	Labourer, beggar, sweeper, coolie.
II	Fruit seller, mason, bricklayer, shop assistant.
III	Shop-owner, master tailor, cloth merchant, motor driver.
IV	Broker, businessman, student, lawyer, doctor.

Considering births in the registration area, information regarding the occupation of the male parent was available in 985 instances only. Of these 729 were registered. Although in most of the 996 registered births, the occupation was noted on the registration form, the information in the centre records was utilized so as to avoid an undue bias in favour of registration.

	1936			1937			1938			1939			TOTAL		
	Registered	Total	Percentage	Registered	Total	Percentage	Registered	Total	Percentage	Registered	Total	Percentage	Registered	Total	Percentage
Doctor ..	8	15	53.3	3	11	27.3	16	19	84.2	7	9	77.8	34	54	63.0
Midwife ..	40	74	54.1	77	114	67.5	100	125	80.0	60	83	72.3	277	396	69.9
Dai ..	171	282	60.6	157	252	62.3	195	243	80.2	123	171	71.9	646	948	68.1
Others ..	2	7	28.6	10	15	66.7	17	24	70.8	4	9	44.4	33	55	60.0
TOTAL ..	221	378	..	247	392	..	328	411	..	194	272	..	990	1,453	..

Since those in comparatively well-placed circumstances tend to summon a doctor or midwife for delivery, the question arose whether all sections of the community are not equally negligent in regard to registration. To obtain more precise information on this point, all births were classified according to the degree of civic sense to be expected from the father and the proportions of registration in the different classes compared.

Civic sense of the male parent.—The occupation of the male parent was used as the basis for estimating civic sense and on this basis infants were divided into four groups. The following schedule gives a list of some of the occupations included in each group :—

The numbers of registered and known births in the different categories are as follows :—

Category

	I	II	III	IV	TOTAL
Registered ..	59	163	171	336	729
Not registered ..	13	50	48	145	256
TOTAL ..	72	213	219	481	985

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There is a significant difference in the proportion of registration in the different categories and surprisingly this is due to poorer registration in category IV. As parents in category IV are more likely to have the delivery conducted in an institution, it is possible that this factor has tended to lower the percentage of registration in this class. Out of the 70 births occurring in institutions within the registration area, 65.7 per cent belonged to category IV, 20.0 per cent to category III, 11.4 per cent to category II and 2.9 per cent to category I. Confining attention only to the births at residence for the four categories, the figures for registration are as follows :—

Category

	I	II	III	IV	TOTAL
Registered ..	59	163	169	333	724
Not registered ..	11	42	36	102	191
TOTAL ..	70	205	205	435	915

No significant difference exists in the percentage of registration of residential births for the four categories.

Sex of infant.—In order to ascertain whether factors such as legal inheritance and descent favour better registration of one of the sexes, the data available were utilized to elicit any difference in the percentages of registration of male and female infants.

births for Hindus and Moslems are given below :—

	MALE			FEMALE		
	Registered	Total	Percentage	Registered	Total	Percentage
1936 Hindus	61	121	50.4	57	108	52.8
Moslems	48	89	53.9	56	90	62.2
1937 Hindus	66	126	52.4	62	101	61.4
Moslems	62	93	66.7	59	99	59.6
1938 Hindus	89	129	69.0	87	127	68.5
Moslems	92	119	77.3	63	76	82.9
1939 Hindus	53	88	60.2	45	83	54.2
Moslems	40	60	66.7	56	73	76.7

There is no significant difference in registration between males and females for either community and the higher percentage of registration in the case of Moslems applies equally to both sexes.

Interval between birth and registration.—According to the Calcutta Municipal Act of 1923, birth has to be registered within 8 days of occurrence, and it was sought to ascertain to what extent the general public is aware of this requirement, by considering the proportion of registrations actually effected within this period.

The interval between birth and registration was divided into six sections, *viz,* an interval of 24 hours, of 8 days, of 2 weeks, of 3 weeks, of 4 weeks and of over 4 weeks. The number of registrations effected in each interval irrespective of the area in which the births took place is given below :—

Interval between birth and registration

	Year	24 hours	— 8 days	— 2 weeks	— 3 weeks	— 4 weeks	Over 4 weeks	TOTAL
Hindus	1936 ..	4	51	26	14	7	21	123
	1937 ..	12	50	28	7	5	29	131
	1938 ..	8	67	26	13	9	59	182
	1939 ..	20	43	15	7	3	13	101
	TOTAL ..	44	211	95	41	24	122	537
Moslems	1936 ..	2	62	18	9	3	13	107
	1937 ..	5	56	18	10	5	28	122
	1938 ..	9	67	29	12	10	31	158
	1939 ..	7	51	14	11	4	13	100
	TOTAL ..	23	236	79	42	22	85	487

In the case of four Hindu births and three Moslem births in 1936 and one Hindu birth in 1937 no information of the sex of the child was available. Naturally these were unregistered. The figures of registration of male and female

It may be mentioned that the date of birth, as given on the registration form, was in some cases different from that entered by the visiting staff. As the health visitor obtains her information at the residence and from the female

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members of the household, it is more likely that her information is correct; the date of birth, as entered by the health visitor, was therefore used in estimating the interval.

In the case of Hindus, the proportion of cases falling into the different groups remained sensibly the same during the period 1936–38, the proportion within 8 days of birth being 44.0. In 1939, however, there was an improvement for earlier registration, 20 per cent of the registration taking place within 24 hours of birth and 62 per cent within 8 days.

In the Moslem community, no change for earlier or later registration was noticeable during the period under study; 4.7 per cent of the registrations took place within 24 hours and 53.2 per cent within 8 days. Considering only the proportion of total registration within 8 days, the Hindu figures were lower than those of the Moslems until 1939. In 1939 the Hindu percentage of registration within the legal period was equal to that of the Moslem community.

Although legally every birth in Calcutta must be registered within 8 days, it was to be expected that in the case of neonatal deaths registration would be poorer. The numbers of known infants alive for or known to have died within 8 days and the related percentages of registration are as follows :—

	Lived for 8 days			Died within 8 days		
	Number	Registered	Percentage of registration	Number	Registered	Percentage of registration
1936	431	225	52.2	25	5	20.0
1937	435	249	57.2	28	4	14.3
1938	477	324	67.9	30	16	58.3
1939	337	192	57.0	12	9	75.0

On the whole there was poorer registration of infants who died within 8 days.

Incidentally it may be pointed out that the number of infant deaths known to have occurred within 8 days, as shown by the above figures, remained constant during the four years, the rate being 53.5 per mille.

Errors in registration.—Not only is complete registration of birth desirable but it is necessary that the particulars supplied to the registrar should be accurate. Of the information contained in the form used in Calcutta for registration of birth, the sex of the child and the date of birth are more important from the point of view of the compilation of birth statistics, and as correct information on these points can be readily obtained by the visiting staff, it was proposed to assess errors in registration due to (1) error in sex, (2) error in date of birth.

Errors of type (1) were too few to receive any serious consideration; but during the four-year period under investigation, in 339 cases, constituting 33.1 per cent of the registered births, the date of birth in the registration form was incorrect when compared with the information available at the centre. Figures for the Hindu and Moslem communities were as follows :—

		Number of registered births	Number with errors
1936	Hindus ..	123	31
	Moslems ..	107	21
1937	Hindus ..	131	34
	Moslems ..	122	46
1938	Hindus ..	182	59
	Moslems ..	158	67
1939	Hindus ..	101	32
	Moslems ..	100	49

Error in registering the date of birth is more frequent amongst Moslems.

The 339 cases were divided into five groups according as the interval between the date of birth as recorded by the centre staff and that on the registration form was less than 48 hours, less than a week, less than 2 weeks, less than 4 weeks, and over 4 weeks. The frequency of the different groups was as follows :—

— 48 hours	— 1 week	— 2 weeks	— 4 weeks	Over 4 weeks
134	97	30	27	51

In only 24 cases was there antedating of birth, and in none of these did the period exceed four weeks. Considering only the post-dated cases the number in the different groups fell as shown below :—

- 48 hours	— 1 week	— 2 weeks	— 4 weeks	Over 4 weeks
123	88	27	26	51

Since in a majority of cases the error was due to post-dating of the birth and since in a high proportion of post-dated cases the interval between the actual date of birth and the date as recorded exceeded one week, it may be asked whether post-dating was unintentional. One motive suggests itself; to avoid the penalty of late registration. A scrutiny of the figures, however, indicated that in a majority of instances, in spite of post-dating, the interval between notified date of birth and the date of registration exceeded the legal period of 8 days. As was to be expected, the longer the interval between birth and registration, the greater the interval between the actual and the recorded dates of birth.

Registration in regard to Public Health Administration

In the foregoing section, the civic implications of the present position of birth registration in Calcutta has been dealt with primarily. There

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now remains to be discussed the bearing of these facts upon public-health administration, as it relates to the dependence of a welfare centre upon official intimation of birth (*i.e.*, a registered birth in the case of Calcutta) for home contact with the new-born infant.

The death rate among infants is the highest in any population within the first month of birth. The aim of a modern community infant-welfare programme is to contact, shortly after birth, all infants born at residence in the area. It is recognized that the value of the programme is greatly reduced if a home visit cannot be paid within 48 hours of birth. Except in a few training or demonstration areas, in no country in the world is the size of the visiting health staff in routine community infant-welfare work based upon the assumption that all live births will be contacted within that period through centre routine procedures alone : some efficient form of official intimation of birth is essential.

Although it is not feasible at present to expect so rapid a home contact in an Indian urban area, the primary consideration in planning and assessing an infant-welfare programme should be the shortening of the interval between birth and the first home visit by the health visitor to the infant.

In Calcutta, for births at residence, the only authoritative procedure, which can be utilized for home contact, is registration of birth which by law must be effected within 8 days.

Despite the fact that rapidity of contact is the essence of health protection, and although it is recognized that registration under such circumstances is not an ideal procedure for the purpose, it is the one at present in use : it was, therefore, deemed advisable in this study to ascertain to what extent intimation of registration affected the interval between birth and first home visit.

In order that registration should function fully as an aid to public-health administration in this way, the first essential is that *all* births should be registered. It has been seen that in the area served by the Institute centre, the average percentage of registration of births at residence for 1936–39 was 68.1 only, so that other factors being favourable, not more than two-thirds of the births in the area *could* have been contacted in this way.

The factors which further influence utilization of registration for infant contact are three :— (*i*) the interval between birth and registration; (*ii*) the interval between registration and intimation to the centre; (*iii*) the interval between receipt of intimation at the centre and first visit to the home.

Under ideal conditions, these intervals in series would occupy not longer than 48 hours. This would entail registration within 24 hours of birth, an interval of not much more than an hour for intimation of registration to the centre, and an interval of less than 24 hours between receipt of the intimation and the time of the first visit to the home.

These intervals will now be discussed in regard to the registered births under investigation for each year of the study.

Interval between birth and registration.— Below is given a table showing the number and percentage of births at residence, which were registered within 24 hours, 8 days, 2 weeks, 3 weeks, 4 weeks and after 4 weeks from birth :—

Interval between birth and registration at residence

Year	— 24 hours		— 8 days		— 2 weeks		— 3 weeks		— 4 weeks		Over 4 weeks		TOTAL
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
1936	6	2.7	110	49.8	43	19.5	21	9.5	8	3.6	33	14.9	221
1937	17	6.9	104	42.1	43	17.4	17	6.9	10	4.0	56	22.7	247
1938	15	4.6	131	39.9	52	15.9	25	7.6	19	5.8	86	26.2	328
1939	27	13.9	91	46.9	27	13.9	18	9.3	6	3.1	25	12.9	194
	65	..	436	..	165	..	81	..	43	..	200	..	990

In 1936 2.7 per cent, in 1937 6.9 per cent, in 1938 4.6 per cent and in 1939 13.9 per cent of births at residence, therefore, fulfil the first condition, namely, that of registration within 24 hours of birth.

Interval between registration and intimation to the centre staff

In considering the relationship between rapidity of intimation and contact with the infant, the time interval between registration and receipt of notice by the centre staff was investigated; the interval was distributed as follows : less than 24 hours, less than 48 hours, less than 72 hours, less than one week and more than one week.

The table below shows the distribution of registered births, according to these intervals, for the years under review, with the exception of 1936, for which year the time of receipt of notice was not available, as the registration lists had been destroyed.

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Interval between registration and receipt of notice in the clinic

Year	— 24 hours	— 48 hours	— 72 hours	— 1 week	Over 1 week	Total with known interval	Unknown	TOTAL
1937 ..	1	30	25	138	27	221	32	253
1938 ..	1	36	51	205	43	336	4	340
1939 ..	0	22	28	97	26	173	28	201
TOTAL ..	2	88	104	440	96	730	64	794

For those births with known interval, in only two cases out of 730 registered births was the interval between registration and receipt of notice in the centre less than 24 hours; in 88 cases, 12.1 per cent, the interval lay between 24–48 hours; in 104 cases, 14.2 per cent between 48–72 hours; in 440 cases, 60.3 per cent between 72 hours and one week, while in 96 cases, 13.1 per cent, the interval exceeded a week.

In the great majority of registered births the interval lay between 72 hours and one week, while in only 12 per cent was the interval less than 48 hours. During this three-year period no significant change occurred towards the shortening or lengthening of this interval, *i.e.*, the proportions in the several groups remained unchanged from 1937–39.

Interval between receipt of notice in the centre and first home visit

When the routine service of a maternity and child-welfare centre includes delivery service, those infants delivered by the staff are necessarily contacted by the health visitor within 24 hours. In order to obviate this vitiation of the findings, in the table given below, only those births have been studied which were first contacted through registration.

The interval between receipt of notice and first home visit to the infant was divided into :—Under 24 hours, 24–48 hours, and exceeding 48 hours.

Interval between receipt of information in the clinic and first visit

	— 24 hours		— 48 hours		Over 48 hours		Total contacted through registration	Total contacted before registration	Total registered births
	Number	Per cent	Number	Per cent	Number	Per cent			
1937 ..	20	18.3	11	10.1	78	71.6	109	144	253
1938 ..	24	14.5	16	9.7	125	75.8	165	175	340
1939 ..	53	49.5	7	6.5	47	43.9	107	95	201

It will be seen that while in 1937 and 1938 only 18.3 per cent and 14.5 per cent, respectively, of these registered births were visited within 24 hours of receipt of notice, in 1939 the figure was 49.5 per cent. These percentages differ significantly owing to the marked improvement which occurred during 1939 in the proportion of contact made with the infant within 24 hours after receipt of notice.

Considering all three factors together, it is apparent that the interval between registration and intimation of birth (which has remained unchanged during the last three years of the study) is too long to permit of administrative procedures benefiting by the trend towards shortening of both the interval between birth and registration and that between receipt of notice and home contact, to the extent of increasing the proportion of contacts within 48 hours.

The fact that in only two cases was the interval less than 24 hours between registration and receipt of notice makes it very apparent that, unless this interval can, by some means, be shortened considerably, *contact within 48 hours of birth must be effected by centre procedures alone.*

Infant contact

Although contact within 48 hours of birth should be the aim, many factors operating upon urban infant-welfare work in this country make it essential at present to relax this requirement.

It was therefore sought to ascertain how far intimation of registration helped infant contact during these four years.

In the tables opposite is shown the number of infants born at residence (1) of those contacted through registration, (2) of those contacted by routine procedures, who were first visited within two weeks, within one month, within three months and later than three months, from birth.

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In all the three years, except for two births, all infants contacted through registration were visited within three months of birth, while of

	Contacted through registration				
	—2 weeks	—1 month	—3 months	Over 3 months	Total
1937	28	52	26	1	107
1938	44	69	44	0	157
1939	61	32	11	1	105
	**Contacted through visits*				
1937	89	63	42	16	210
1938	83	49	33	6	171
1939	49	38	22	9	118

*Excludes 75 cases in 1937, 83 cases in 1938 and 49 cases in 1939 delivered by the centre staff.

those contacted by routine procedures, 31 out of 499 were over three months of age when first visited. Since these 499 births include those visited prior to receipt of intimation of registration, it may be concluded that, in a fair proportion of unregistered infants, contact by routine procedures took place in the second trimester of life.

In 1939, apart from earlier registration, which has already been mentioned, the interval between receipt of intimation and the first home contact tended to decrease. In 49.5 per cent of cases contacted through registration this interval was less than 24 hours. The combined effect of these two factors was to increase the proportion of contacts through registration *in the interval less than two weeks after birth.* In the same year it is seen that the proportion of infants contacted within two weeks is significantly higher in the case of infants contacted through registration.

It therefore emerges that, in spite of the long interval between registration of birth and intimation to the centre, public health administration in infant welfare *does benefit from utilization of registration returns* although not as regards contact within 48 hours.

In 1939, although registration lists were received somewhat irregularly on an average four to five times a month, it was possible to contact, within 24 hours of receipt of notice, about 50 per cent of those births first heard of through registration. This occasionally necessitated contacting four births in a day, which is bound to effect some disturbance of routine duties. Reduction in the interval between registration and intimation to the health visitor would therefore lead to earlier contact in two ways : firstly, by providing an opportunity for contact immediately after registration, and, secondly, by helping to establish, through the receipt, more frequently and regularly, lists containing fewer births, an almost daily routine which would interfere very little with other duties.

However, even under ideal conditions, utilization of registration has a limited value. If it were decided to use registration for contact within 48 hours, the legal period of eight days would have to be shortened. The other alternative, and the more satisfactory one, would be to introduce a system of notification to the health authorities.

Notification : Its utilization for infant contact and improvement of birth registration

The system of notification which is envisaged is really an extension and modification of the existing system of notification in operation for births taking place in maternity institutions approved by the Calcutta Corporation and for those conducted by the Corporation domiciliary midwifery service.

By notification of birth is intended compulsory notification within 36 hours to the district health officer, or his deputed representative, of all births (including still-births) by the delivering agent (or professional attendant called in within a few hours of birth). Such a delivering agent might be a doctor, nurse, midwife or *dai.* The measure would embrace births occurring at residence or in an institution.

At the local office, a list of notified births would be compiled immediately in conformity with the districts served by the home-visiting child-welfare agencies, and this list despatched either by bicycle messenger to the centres or collected daily from the local office by a messenger from each centre. As voluntary organizations carrying on infant-welfare service are heavily subsidized from Corporation funds, and as notification would be introduced as a health measure primarily, and not one for the collection of vital statistics, no distinction between official and voluntary organizations should arise either as notifying agents or for access to lists of notified births. The lists would naturally be open to inspection by the Registrar of the area.

This procedure should permit of contact with the infant within three days of birth in the majority of cases and would enable the registrar to discharge the responsibility laid upon him under the Calcutta Municipal Act to effect registration of births not registered within eight days. It would further ensure that hospital births at present notified would be notified more promptly and would be included in the list of births prepared for the use of the home-visiting welfare workers.

The maternity service of the Corporation could also extend its facilities without further expenditure, as it would be relieved of infant-welfare service after the first 48 hours. Co-operation between the agencies working for infant welfare would be strengthened and the aims of the health service clarified.

Although free midwifery service by a certificated midwife may act as an impediment to complete co-operation at first, the difficulty of inducing the *dai* to act as a notifying agent

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should not be great, provided the purpose for which information is needed is made clear, and provided centre staffs make contact with the *dais* in their districts. It has been shown that registration of births is not poorer in the case of delivery by *dais*, indicating that registration is not discouraged by them.

In the case of the trained midwife and the nurse, notification of birth is perhaps a natural corollary to registration under the Nursing Council Act.

Summary and conclusions

This study was undertaken with the object of ascertaining whether registration of births in its present legal aspect and as practised by the public in Calcutta could be utilized by an infant-welfare centre to make earlier contact with the infants born in the area it serves.

With this object the proportion of registration effected was estimated for infants born to parents resident in the area served by the maternity and child-welfare centre of the All-India Institute of Hygiene and Public Health, Calcutta, during the years 1936–39.

As the average percentage of registration for that period was 62.6, at the highest estimate, it was considered desirable to elicit, as far the data available permitted, the factors which might have brought about this deficiency.

An important factor was found to be the poorer registration of institutional births, which was 4.3 per cent against 68.1 per cent for births at residence. This is probably due to the public interpreting as registration the notification of births, which is compulsory in recognized maternity institutions in Calcutta. Muslim registration was throughout higher than Hindu registration and significantly so in 1938–39. This difference was shown to be due to the greater utilization of institutional facilities by the Hindu community.

Registration of births at residence did not appear to be influenced by the attendant at delivery, whether doctor, midwife, or *dai:* nor by the sex of the child.

Excluding the influence of institutionalization, registration was not found to vary with the sense of civic responsibility as judged by the occupation of the male parent.

Errors of registration were studied as they are of both statistical and administrative importance, particularly those related to the date of birth and the sex of the infant. It emerged that in approximately one-third of registered births, the date of birth differed from that noted in the centre register, the tendency being towards post-dating. The object did not appear to be to reduce the interval between birth and registration to the legal period of eight days. Errors in registration of the sex of the infant were negligible.

The utilization of registration of birth for rapid contact with the infant depends upon

(1) the interval between birth and registration,
(2) the interval between registration and receipt of notice in the centre,
(3) the interval between receipt of notice and the first home visit by the health visitor.

Although there was a tendency towards earlier registration and also more rapid contact after receipt of intimation of registration, particularly in 1939, the interval between registration and intimation to the centre remained constant. During 1937–39 in 60.3 per cent of cases this interval lay between 72 hours and one week. This rendered intimation of registration ineffective for contact within 48 hours of birth.

Notice of registration was, however, found to influence favourably home contact within two weeks of birth. Under existing procedure in 1939 nearly half of the infants contacted through registration were visited within 24 hours of receipt of intimation. It is therefore concluded:

(*i*) that if the interval between registration and receipt of intimation by the centre were appreciably reduced, considerable improvement in rapidity of contact would be possible, without dislocating the routine services of a maternity and child-welfare centre.

(*ii*) that for registration of birth to be fully effective for contact within 48 hours of birth, not only should registration be complete, but also the legal period would have to be markedly reduced.

(*iii*) that in view of the impracticability of shortening the legal period of registration, the introduction of compulsory notification of birth, as indicated in the text, is probably the better solution of the problem.

Acknowledgment

The authors wish to express their thanks to Dr. R. B. Lal for providing the schedules and cards for this enquiry, and to Dr. Muktha Sen for assistance in checking the births in the registration lists with those in the centre records.

Reviews

COMMON SKIN DISEASES.—By A. C. Roxburgh, M.A., M.D., B.Ch. (Cantab.), F.R.C.P. (Lond.). Sixth Edition. 1941. H. K. Lewis and Company, Limited, London. Pp. xxxi plus 436, with 8 plates and 179 figures in the text. Price, 16s.

It is a pleasure once again to note the appearance of the sixth edition of this excellent small book on skin diseases. Since 1932, when the book first appeared, a new edition has come out regularly every second year. In every edition improvements and additions have been made, necessitated by advance in our knowledge of ætiology and improved methods of treatment that are introduced.

In the present edition some of the principal additions, among the many that have been made, are a note on the use of Thorium X, which affords a simple means of applying radiation treatment by means of an ointment or varnish, the ætiology of impetigo has been revised in view of the accepted fact that it may be streptococcal and/or staphylococcal in origin, and the newer

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treatments for scabies and pediculosis have been included. Dermato-myositis has been added; until quite recently this disease has been regarded as so rare as to be more or less a curiosity, but a much larger number of cases have been reported in the past two or three years; the explanation is that in all probability it is not due to an increase in the disease but to a better knowledge of dermatology by the general practitioner, a possibility not unconnected with the publication of such books as the one we are reviewing.

We are pleased to see that the subject of avitaminosis has been revised and amplified, more particularly as we expressed the hope that this would be done, when we reviewed the fifth edition.

When we reviewed the second edition we noted the inevitable tendency to increase in length, compared with the first. This is a necessity if a subject is to be kept up to date and when one starts with bare necessities as the author did in his first edition it is not possible to balance additions by whittling down the old parts. We have not the early editions at hand at the moment, but the increase between the third and the sixth is only 56 pages. Therefore the author is to be congratulated on the manner he has met this difficult and essential aspect of regular republication of a book, namely keeping it up to date without making it a great deal larger.

It is remarkable that the publishers are still able to produce the book in exactly the same high class style and to make use of the same paper and bindings as they did in the pre-war editions.

P. A. M.

AN INTRODUCTION TO MEDICAL SCIENCE.—By William Boyd, M.D., M.R.C.P. (Edin.), F.R.C.P. (Lond.), Dipl. Psych., F.R.S. (Canada). Second Edition. 1941. Henry Kimpton, London. Pp. 358. Illustrated with 124 engravings. Price, 16s.

IN his preface the author indicates that he has written the book for the probationer nurse to enable her to gain some general insight into her work, before she has acquired special knowledge from her courses of lectures.

It is an excellent book for this purpose but we would recommend it also to medical students at the beginning of their hospital work as we are sure they would find it of great value. The reviewer can still recollect his difficulty in gaining real comprehension of what he was doing and why he was doing it, until he had been attending the hospital for a considerable time. Such a book as this would have greatly shortened this period of uncertainty.

If we may offer a suggestion whereby this book could be improved we consider a small glossary would be a valuable addition. As an example, the novice would be at a loss to know what is meant on p. 45 where he is told that thrombosis occurs in the *auricles* of the heart and it is not until he reaches p. 131 that he finds an explanation, and again throughout the excellent summary of the pathogenic bacteria the distinctions 'Gram-positive' and 'Gram-negative' are repeatedly used without saying what they mean; other similar examples can be found. Apart from this minor defect, which can be easily rectified in the next edition, we have nothing but praise for the conception behind the book and for the manner in which the subject has been presented.

P. A. M.

SYMPTOMS IN DIAGNOSIS.—By Jonathan Campbell Meakins, M.D., LL.D. 1941. Little, Brown and Company, Boston. Pp. xxi plus 323. Illustrated.

IN recent years there has been a tendency to give less importance to the interpretation of symptoms in the diagnosis of a disease than to the physical signs and/or laboratory findings. But it is the symptoms which bring the patient to the physician, and there are many diseases that have no particular signs. A good history and a proper evaluation of complaints cannot therefore be underestimated. A typical case of coronary occlusion may be correctly diagnosed by listening to the patient's way of telling his story; it would be unfair to neglect this and rush for an electro-cardiographic tracing to recognize the condition, not without patient's discomfort and financial loss, although the value of the latter is undisputed. The modern advance of chemical, physical and physiological methods in clinical medicine should be utilized in the interpretation of symptoms, on a firmer foundation to-day than ever before.

Dr. Meakins has interpreted in this book the common symptoms in the light of recent scientific and clinical knowledge. It is divided into five sections. The first chapter deals with the physical characteristics of the body with reference to growth, stature, weight, obesity and emaciation, of which there is a good number of illustrations. Next, the cutaneous manifestations have been discussed, including the fundamental mechanism of cyanosis, œdema, etc. The subsequent chapters are on disturbances of sensation with special reference to various pains, symptoms of localizing value, mostly in connection with the gastro-intestinal and respiratory tract, and on symptoms having reference to general function, *viz,* fatigue, disorders of sleep and coma.

The book will prove useful to students and physicians in the practice of medicine.

R. C.

ROENTGEN INTERPRETATION.—By George W. Holmes, M.D., and Howard E. Ruggles, M.D. Sixth Edition. 1941. Henry Kimpton, London. Pp. 364. Illustrated with 246 engravings. Price, 24s.

OWING to the untimely death of Dr. Howard Ruggles the sixth edition of this well-known work on *x*-ray interpretation has been prepared by the co-author Dr. G. W. Holmes.

The subject-matter has been reviewed and brought up to date. Some illustrations have been replaced and new ones added. Recent important advances in roentgen diagnosis have been described and illustrated. No attempt has been made to change the general character of the book.

While there is no claim to cover the entire subject completely, there are few conditions which do not receive adequate treatment, the most notable exception being pregnancy and abnormalities of the fœtus.

As an introduction to *x*-ray interpretation, however, and on account of its freedom from descriptions of apparatus and technique it makes a special appeal to the practising physician and surgeon.

For those requiring additional information on any of the subject-matter an extensive bibliography is provided at the end of each chapter.

The publishers are to be congratulated on the general appearance of the work, the clear type and excellent illustrations.

J. A. S.

MEDICAL ELECTRICITY FOR MASSAGE STUDENTS. —By Hugh Morris, M.D., D.M.R.E. Second Edition. 1941. J. and A. Churchill Limited, London. Pp. xiv plus 394, with 114 Illustrations. Price, 18s.

A SECOND edition of this well-known work will be welcome to those who have read the first edition. As the author says this is really a new book. The contents of the first edition have been thoroughly revised and new chapters on diathermy and ultra-violet rays have been added. A number of new line diagrams have been included.

The early chapters are concerned entirely with physical problems and, though of an elementary character, give a clear and up-to-date outline of the subject.

The later chapters are equally praiseworthy, particularly the new chapters on diathermy and ultra-violet rays.

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As it stands, it covers the course for the electrotherapy examination of the Chartered Society of Massage and Medical Gymnastics.

The publishers are to be congratulated on the attractive manner in which they have produced the book.

J. A. S.

CHOLERA: ITS PREVENTION AND CURE.—By A. J. H. deMonte, Dp. Bact. (Manchester), I.M.D. 1941. Thacker, Spink and Company (1933), Limited, Calcutta. Pp. 60. Price, Re. 1

THE danger from cholera is ever present in India, in Bengal and Madras for practically the whole year round and in other parts of the country for a number of months each year.

It is therefore important that not only should doctors know how to prevent, diagnose and treat cholera, but householders, and more especially those who are responsible for the health of larger bodies of people, such as managers of industrial concerns where much labour is employed, school masters, missionaries, etc., should learn how to recognize, and should be conversant with, at least the principles of prevention and cure of this dread disease.

The author, who has been attached to the School of Tropical Medicine for 11 years, and during the last 7 years has been in charge of the bowel disease research department, has had considerable practical experience in the treatment of cholera in the field and more recently at the Campbell Hospital in Calcutta.

This small booklet is particularly welcome, as it is written in a language which the layman can understand but which is yet scientific enough to give the doctor all the special instructions that he will require for treating this disease in the most efficient and up-to-date manner.

Abstracts from Reports

TWENTY-EIGHTH ANNUAL REPORT OF THE CHIEF ENGINEER, PUBLIC HEALTH DEPARTMENT, BENGAL, FOR THE YEAR ENDING DECEMBER 1940

THERE was steady progress of public health engineering works in the province during the year. Besides the permanent executive staff of one chief engineer, three executive engineers, three assistant engineers and one superintendent of waterworks, the department also maintained several temporary hands in the subordinate engineering establishment in order to cope with the work.

Fourteen works of sanitary engineering were executed under the supervision and control of the department. Besides, the department also continued to maintain the Baranagar-Kamarhati joint waterworks, the Kalimpong and the Maijdi waterworks as in the previous year.

The department rendered valuable assistance in the shape of advice and suggestions to other departments, local officers and local bodies in matters relating to works of sanitary engineering.

The Sanitary Board held only three meetings and considered seven sketch projects and eight detailed projects, all of which except the detailed project regarding the Tollygunge Protective Embankment were approved and recommended to Government for sanction subject to certain conditions in regard to particular cases. The Board also considered a few anti-malaria schemes.

The malaria sub-committee of the Board prepared a draft of a Bengal Anti-Malaria Bill which was considered and approved by the Sanitary Board. A nutrition sub-committee of the Board was established during the year for the purpose of providing a co-ordinating body for the several local agencies undertaking activities in nutrition.

The proposal by the Director, All-India Institute of Hygiene and Public Health, for the establishment of a Nutrition Committee of the Board for the purpose of providing a Bengal co-ordinating body for the several local agencies undertaking activities in nutrition without any financial liability on the part of Government was considered and accepted by the Board. A committee with power to co-opt was accordingly constituted. A resolution to the effect that a new section on improvement of milk supply in Calcutta and other towns of Bengal be included in the programme of the Nutrition Committee was referred by the Board to the said committee for necessary action.

Correspondence

MINOR DRUG HABITS OF INDIA

SIR,—In part II of 'Minor Drug Habits' in your issue for February, under the heading of 'Chemistry of a Cup of Tea', on p. 109, no mention is made of theophyllin as being one of the constituents of tea. A little further disquisition on this alkaloid would be interesting; as Hale White's *Materia Medica*, twenty-third edition (the only book I have which mentions it), is rather sketchy. Older books don't mention it.

Theobromine is once or twice referred to, as if its composition and effects were the same as those of caffeine, which is hardly the case.

On p. 124 of your same issue, the use of ipecacuanha is deprecated (though some medical men approve of it) and para 2 opens with the remark that 'Ipecacuanha is not indigenous to India'. No; but *acalypha indica* is, and its action is, said to equal that of ipecac. Is this true? What is its vernacular name?

G. F. ROWCROFT,
Colonel.

COONOOR,
27th February, 1942.

Note.—With reference to Colonel Rowcroft's letter, theophyllin has been isolated from tea in minute quantities. Its effect on the gastro-intestinal system is only produced when a person consumes large quantities of tea during the course of a day. But as the heading goes, in 'Chemistry of a Cup of Tea'—caffeine and tannin are the chief constituents on which the physiological effect depends.

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Theophyllin has not been mentioned as the quantity present in a cup of tea is negligible.

Theobromine is a dimethylxanthin and caffeine a trimethylxanthine, both are purine derivatives, and their effects so far as the kidneys are concerned are similar.

Acalypha indica Linn (Sanskrit—Arittamunjayrie, Hindi—Khokali, Bengali—Muktajuri) is indigenous to India; it has emetic properties and may be used as a substitute for senega in bronchitis, but it will not replace *Psychotria ipecacuanha* Linn as an amœbicidal drug.

(Sd.) J. GUPTA.

DEPARTMENT OF PHARMACOLOGY,
SCHOOL OF TROPICAL MEDICINE,
CALCUTTA.
The 5th March, 1942.

Service Notes

APPOINTMENTS AND TRANSFERS

THE services of Lieutenant-Colonel H. K. Rowntree, M.C., I.M.S. (Retd.), Additional Deputy Director-General, Indian Medical Service (Stores), are replaced at the disposal of His Excellency the Commander-in-Chief in India, with effect from the 28th November, 1941.

Lieutenant-Colonel A. S. Fry, on transfer from Simla, assumed officiating charge of the office of Professor of Operative Surgery, K. E. Medical College, Lahore, on the forenoon of the 6th February, 1942.

Major B. A. Porritt is appointed Additional Officer at the Medical Stores Depot, Lahore Cantonment, with effect from the forenoon of the 11th December, 1941.

Major B. N. Khan is appointed Deputy Assistant Director-General (Medical Stores), Medical Stores Depot, Madras, with effect from the afternoon of the 22nd December, 1941, *vice* Lieutenant-Colonel W. M. Will appointed to officiate as Additional Deputy Director-General, Indian Medical Service (Stores).

On transfer to Lahore, Major G. J. Joyce made over charge of the office of Civil Surgeon to Dr. Ram Singh Sharma, on the afternoon of the 31st January, 1942.

On transfer from Amritsar, Major G. J. Joyce assumed charge of the office of Civil Surgeon, Lahore, on the afternoon of the 2nd February, 1942, *vice* Major S. Smyth.

On transfer from Lahore, Major S. Smyth assumed charge of the office of Civil Surgeon, Simla East, on the afternoon of the 5th February, 1942, *vice* Lieutenant-Colonel A. S. Fry.

The undermentioned Lieutenants (on probation) are confirmed in their rank, with effect from the dates specified:—

LAND FORCES

(*Emergency Commissions*)

J. L. McCallum. Dated 3rd January, 1941.
C. M. Bisset. Dated 13th March, 1941.
W. G. Anderson. Dated 15th March, 1941.

12th April, 1941

A. E. Stevens. J. D. Hardy.
E. L. Lloyd.
F. Lake. Dated 13th April, 1941.
A. D. Iliff. Dated 15th April, 1941.

5th May, 1941

L. J. Michael. R. H. Neeve.

6th May, 1941

H. C. Duncan. H. W. T. Martin.
F. T. Harrington.
G. D. Lehmann. Dated 5th June, 1941.

6th July, 1941

H. Flack. J. H. Arthur.

The undermentioned Lieutenants (on probation) are confirmed in their rank, with effect from the date specified:—

INDIAN LAND FORCES. INDIAN MEDICAL SERVICE (DENTAL BRANCH)

(*Emergency Commissions*)

5th June, 1941

R. N. Dogra. W. Singh.
I. M. Manchanda. R. B. Das Sagreiya.

5th July, 1941

S. F. Ilahi. V. S. Sehgal.
R. Pratab. J. R. Das Ahuja.
M. Raj. M. Shafique.
W. J. Siqueira. Dated 6th July, 1941.

(*Emergency Commissions*)

To be Lieutenants

Walter Neville Owen George. Dated 27th September, 1941, with seniority from 27th September, 1940.

Desmond Stopford Muloch Euraght-Mooney. Dated 27th October, 1941, with seniority from 27th October, 1940.

Michael Seager. Dated 27th October, 1941, with seniority from 27th April, 1941.

INDIAN LAND FORCES

(*Emergency Commissions*)

To be Lieutenants (*on probation*)

5th November, 1941, with seniority from 5th August, 1941

Sebastian Alex DeSouza.
Charles Andrew Martin.
Lovel Austin Noel Greenway.
Joseph Willoughby Meyers.
Gilbert Nicholas Rodgers.
Godwin Lionel Robbins Tapsall.
Reginald Francis Fleming.
Clive Hope Smith.
Frank Ernest Buckler.
Henry Louis Francis.
George Lewellyn McDermott.
Norman Valetine Mervin Stevenage.
John Bernard Cecil de Lemos.
Denis John Burnett.
George Frederic Martinus.
Wilfrid Eric Joseph Ward.
Ernest Edmunds Vaughan.

6th November, 1941, with seniority from 5th August, 1941

Aurthur Norman deMonte.
Cyril Francis Vieyra.
James Stephens Percival Coutts.
Arthur Benjamin Osborne.
James Ernest Garson.

7th November, 1941, with seniority from 5th August, 1941

Patrick Frank Fanaken.
Robert Mascarenhas.
James Anthony Amor.

8th November, 1941, with seniority from 5th August, 1941

Henry Clarence Halge.
Robert James Foy Camprell.

William Roger Kirkpatrick. Dated 11th November, 1941, with seniority from 5th August, 1941.

John MacNeish Stirling. Dated 17th November, 1941, with seniority from 5th August, 1941.

Champadil Krishnan Padmanava Menon. Dated 2nd February, 1942.

Chitra Kanaka Prasada Rao. Dated 3rd February, 1942.

Raman Viswanathan. Dated 4th February, 1942.

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Gnanapragasam Pubala Rayen. Dated 5th February, 1942.

Vellore Ratnam Thayumanaswami. Dated 29th January, 1942.

2nd-Lieutenant F. M. W. Harrison (E. C. O.) is appointed as an Additional Officer at the Medical Stores Depot, Bombay, with effect from the forenoon of the 5th January, 1942.

PROMOTIONS

Brevet-Colonel to be Colonel

B. C. Ashton, V.H.S. Dated 13th October, 1941, with seniority from 1st January, 1935.

Lieutenant-Colonel Jamal-ud-Din has been advanced to the higher position of his rank in the increased pay admissible.

Captains to be Majors

1st February, 1942

F. R. Cawthorn. F. W. Allinson.
W. B. Stiver. F. V. Stonham.

(Emergency Commissions)
Lieutenants to be Captains

15th January, 1942

K. A. L. Bangash. G. J. Bhatt.
S. C. Bose. Balbir Singh.
A. Hasan. Hari Das.
W. A. Nandedkar. N. Krishnaswami.
P. M. Bhandarkar. R. L. Pathak.
A. Das. L. N. Bakshi.
A. N. Kalra. M. R. Thapliyal.
N. S. Gaitonde. S. Kesavulu.
A. M. Chakravarty. M. A. Nair.
H. C. Dhawan. K. S. Bhushanam.
S. R. Chowdhury. S. Gnaneswaran.
E. Edwards. T. V. Ranganathan.
K. K. Bhatt. P. S. D. Raja.
E. R. Menon. P. R. Saksena.
S. M. Quershi.

16th January, 1942

A. S. Choudhuri. C. J. David.
C. L. Bhatia.

1st February, 1942

M. Singh. Z. A. Sapru.
T. E. Unny. E. B. Mody.
V. R. Sane. G. S. Sandhu.
D. J. Shroff. K. A. Rashid.
M. S. Kapur. M. P. Misra.
P. P. Hazari. R. A. Hakim.
A. B. Gune. C. M. Muthu.
S. H. Ahmad. H. Singh.
N. Rahman. D. Singh.
M. D. Joshi. D. S. Gupta.
K. D. Veeraraghavan. A. Thimmappaya.

2nd February, 1942

M. Sumasundaram. N. S. Pillay.
S. V. Kail. R. Raghavan.

INDIAN MEDICAL SERVICE (DENTAL BRANCH)

(Emergency Commissions)
Lieutenants to be Captains

1st February, 1942

Muhmud Ahmad. Sheikh Nazeer Mohammad.
Raj Sethi. Vere Oswald Arathoon.
Kartar Singh. Joginder Singh.
Munawar Qureshi.

Notes

DEXTROSOL IN THE NUTRITION AND TREATMENT OF INFANTS

WE have received a copy of a new brochure: *Dextrosol in the Nutrition and Treatment of Infants.*

At this opportunity we would mention that continuity of abundant supplies of dextrosol is naturally enlivening interest in many of the applications of dextrose which were hitherto not widely known, and one such is its use as an antiseptic and hæmostatic.

A dextrose poultice or concentrated solution is used to provide biological antisepsis in both internal and external conditions. Offensive discharging wounds or sores, infected operation wounds, pruritis vulvæ and ani, and various skin infections are thus healed.

In the treatment of atonic wounds, gauze bandages soaked in 40 per cent dextrosol solution cause the discharge to cease, and yield better results than the standard therapeutic agents. Where a rapid granulation of ulcers is desired, 2 per cent zinc sulphate solution is added. Sturm incorporates dextrosol into a salve with lanoline for the treatment of ozæna and simple atrophic rhinitis.

A swab soaked in 50 per cent dextrosol solution arrests hæmorrhage, and Eason employs this to arrest bleeding in epistaxis, purpura, and the like, when other local measures fail. In hæmatemesis, oral hourly administration of ½ oz. of 50 per cent dextrosol solution, besides its styptic action, is of definite nutritional value to the patient.

Copies can be obtained free from Corn Products Company (India), Limited, Post Box 994, Bombay.

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Original Articles

THE PATHOLOGICAL HEART CONDITIONS IN HOOKWORM DISEASE AND THEIR CAUSES

By ROBERT HEILIG, M.D.

First Physician, Krishnarajendra Hospital, and Professor of Medicine, Medical College, University of Mysore

THE clinical picture of the heart affection in a severe hookworm infection resembles certain valvular diseases in so many features that one has to describe it in some detail to recognize the characteristic points necessary for the differential diagnosis.

Palpation of the heart region reveals displacement of the apex beat outwards and downwards, usually in the sixth inter-costal space outside the mid-clavicular line, and sometimes situated in the anterior-axillary line; the apex beat is slapping, snapping, quickly disappearing, unless the heart muscle is badly damaged, subsequent to which condition it becomes diffuse, indistinct or inpalpable. The heart rate is increased to about 110. Sometimes a systolic thrill is palpable in the apical region and occasionally the second pulmonary sound is to be felt in the second left interspace at the left heart border. Epigastric pulsation is frequently present. Purcussion shows that the heart is enlarged to the left, and also downwards and to the right, resembling the configuration of an enlarged mitral heart ('third stage'). On auscultation, one finds in the apical area a loud, thumping first sound, corresponding to the slapping apex beat; it becomes fainter with a progressive myocardial weakness. In the same area a systolic murmur is audible, sometimes harsh, sometimes softer, and not rarely conducted towards the axillary region; if it is harsh and low-pitched, a systolic thrill is palpable. The pulmonary second sound is frequently accentuated and a systolic murmur, louder and harsher than that in the apical area, is audible. Both the murmurs are diminuendo in character. Whether a thrill is palpable in the pulmonary area depends again on the number of vibrations produced by the murmur; the lower pitched it is, the more probable is the appearance of a thrill.

X-ray examination reveals a dilatation of the left ventricle, the pulmonary cone and the right auricle; the 'heart waist' or incisure is usually straightened, so that the picture of an enlarged mitral heart results, but the pulsation of the heart silhouette is quite different from that seen in mitral disease; it is considerably increased and resembles the expansile pulsation in aortic regurgitation.

The electrocardiogram of untreated severe hookworm anæmias is very typical. The general 'voltage' is low; the P-Q interval usually normal; the Q R S complex occasionally more than 0.1 sec. but not severely damaged; the S-T junction sometimes slightly depressed or convex downwards. The main changes are manifested in the T waves. They are almost in all cases very flat or absent (iso-electric) or even inverted, proving beyond doubt a severe diffuse myocardial damage. These changes are reversible to a surprising extent, as shown in the case reports that follow, and they are clearly illustrated in the cardiograms reproduced.

The pulse rate is high in the untreated stage of hookworm anæmia; but a characteristic bradycardia frequently accompanies the improvement of the blood condition. The pulse quality depends on the quality of the heart muscle; it varies from a thread-like to a moderately well-sustained pulse.

The blood pressure is a characteristic feature : a systolic pressure between 95 and 110 mm. Hg. and a very low diastolic pressure of 65 down to 50 mm. Hg. Therefore, a high pulse pressure is so constantly found in untreated cases that a normal diastolic pressure militates against ancylostomiasis as the cause of a severe anæmia or against the diagnosis 'ancylostomiasis heart'. The improvement of the blood condition is accompanied by a moderate rise of the systolic and a definite elevation of the diastolic pressure, reaching about 115/80 mm. Hg.

Neither liver nor spleen enlargement belong to the uncomplicated picture.

The urine does not show any changes due to hookworm disease. Albumin and a pathological sediment are absent; the water elimination and the ability to concentrate are impaired only if œdema or ascites is present.

Though we are concerned here with the heart condition only, the typical behaviour of these patients and their blood condition has to be mentioned because these features are of the greatest diagnostic significance. The greyish paleness of the face and the palate, the dirty earthy tinge of the malar region, the frequently present puffiness of the eye-lids which may be increased up to heavy œdema, are well known. Ascites and general anasarca are common findings, but it is important to emphasize that even the worst degree of this anasarca is not accompanied by dyspnœa without exertion; all these patients lie flat on their back or one side, they do not show signs of air hunger, they are never orthopnoic, and their sleep is not disturbed by dyspnœa. Neither is cyanosis, nor is a subicteric tinge present. The blood examination shows the severest degrees of a microcytic, hypochromic anæmia which is compatible with life. Red cell counts of 0.7 millions and a hæmoglobin content of 10 per cent Sahli and less are no rarity.

The differential diagnosis of this condition from a decompensated mitral valvular disease with right heart failure is of the greatest importance as the treatment, as well as the patient's fate, is determined by it. Palpation,

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percussion and auscultation of the heart are in many cases not sufficient for the differentiation. The deciding features are dyspnœa up to orthopnœa, cyanosis, mostly with a sub-icteric tinge, liver enlargement, kidney congestion with oliguria, albuminuria and urobilinuria, a normal diastolic pressure and normal or increased values of red blood cells and hæmoglobin in a heart failure due to mitral regurgitation, and the absence of all those symptoms and signs in ancylostomiasis.

The question as to how hookworm disease causes damage to the heart is answered usually by reference to the anæmia; the murmur is always called a hæmic murmur, the pathological condition of the heart muscle described as flabby due to fatty degeneration, caused by the anæmia. If it is right that the hookworm anæmia *only* is responsible for the accompanying heart condition, all the pathological signs have to disappear with a sufficient improvement of the blood condition, provided they are reversible at all.

Present investigation.—To investigate this question, we used the following method. Patients with a severe hookworm anæmia and no other detectable disease have been selected. Before any treatment was started, the orthodiagram, in some cases a teleradiogram of the heart and in all cases the electrocardiograms have been taken, the erythrocyte count and hæmoglobin (with Sahli's hæmometer, 'Amsco', U. S. A. 100 per cent = 15 g.) have been exactly estimated. Then these patients have been put on a uniform anti-anæmic treatment, consisting of freshly prepared Blaud's pills, 90 grains per day. As soon as the hæmoglobin level reached about 30 per cent, an intramuscular injection of calcium gluconate (10 per cent 10 c.cm.) was given daily, while the iron medication was continued until the hæmoglobin estimation showed a value of 40 per cent. At this stage the anthelminthic treatment was performed by giving minims 30 to 45 of carbon tetrachloride combined with minims 10 to 15 of oil of chenopodium, divided in two to three doses. The hookworms passed during the following 12 hours have been counted or—if too numerous—roughly estimated. Four to six motions, examined on alternate days, had to be free from hookworm eggs before a patient was declared as free from hookworms.

The diet consisted of two pints of milk, bread, rice-polishing and one or two eggs, if the patient was willing to take them.

During this treatment, at weekly intervals, the erythrocyte count, the hæmoglobin level and the blood pressure have been exactly estimated, the orthodiagram and, in a few cases, the teleradiogram taken on admission and repeated at a hæmoglobin level of about 25 per cent and again, before deworming, when the hæmoglobin value had reached 40 per cent. The electrocardiogram was recorded once a week simultaneously with the blood examination. In most of these cases and especially when the improvement of the heart condition was not satisfactory before the day of anthelminthic treatment, all these examinations have been repeated eight to twelve days afterwards.

Results.—Ninety per cent, *i.e.*, 59 of the 65 cases, followed up in this way, responded with a gradual and very considerable improvement of the heart condition, strictly parallel with the increase of red blood cells and hæmoglobin figures. A few typical cases are reproduced on plate VII under the heading: 'heart improvement accompanying improved blood condition, without deworming' and the essential facts reported in the following case reports:—

Plate VII, fig. 1.—Hindu ryot, 17, investigation, case no. 45—

(*a*) 26th April, 1941—red cells 1,130,000; hæmoglobin 14 per cent Sahli; blood pressure 90/50; heart measurements (teleradiogram): ml. 10.5, mr. 6; trans. diam. 16.5 cm.; electrocardiogram: low voltage; T I, T II flat; T III slightly inverted; T IV biphasic; signs of a diffuse, moderate myocardial lesion.

(*b*) 12th May—red cells 2,040,000; hæmoglobin 25 per cent; blood pressure 110/65; heart measurements: ml. 9, mr. 5; trans. diam. 14 cm.; cardiogram: voltage generally increased; T I, T II almost normal; T III flat positive; T IV biphasic, flat.

(*c*) 26th May—red cells 3,320,000; hæmoglobin 42 per cent; blood pressure 115/70; heart measurements: ml. 7.5, mr. 5; trans. diam. 12.5 cm.; cardiogram: perfectly normal in all four leads.

The next day carbon tetrachloride yielded some 500 worms; the motions, examined five times within the next ten days, did not contain any worm eggs.

3rd June—red cells 4,110,000; hæmoglobin 52 per cent.

Thirty days of iron treatment, *before* deworming was performed, increased the red cells by 2,200,000, hæmoglobin by 28 per cent, *i.e.*, to thrice the initial content, reduced the transverse diameter of the heart by 4 cm. and cured all signs of heart muscle damage, as determined in the electrocardiogram.

Fig. 2.—Hindu ryot, 30, investigation, case no. 54—

(*a*) 7th October, 1941—red cells 1,250,000; hæmoglobin 10 per cent; blood pressure 95/50; heart measurements (orthodiagram *): ml. 12.5, mr. 7; trans. diam. 19.5 cm.; cardiogram: T I isoelectric; T II, T III, T IV very flat; R IV low; diffuse myocardial damage.

(*b*) 19th November—red cells 3,020,000; hæmoglobin 40 per cent; blood pressure 115/75; heart measurements: ml. 8.7, mr. 5.5; trans. diam. 14.2 cm.; cardiogram: the R waves more than twice the voltage of those in (*a*); R IV increased from 2 mm. to 12 mm.; the T waves in all leads very well developed—an ideally normal cardiogram.

The same day innumerable hookworms were passed after carbon tetrachloride; the motion remained free from hookworm eggs for eight days.

The progress in this case is still more striking than in the previous case. In forty-two days the red cell count increased by 1,800,000, the hæmoglobin content reached more than the fourfold of the initial value, the transverse diameter of the heart was reduced by 5.3 cm., *i.e.*, more than 25 per cent, and the severely damaged myocardium became perfectly healthy as the decided differences in the cardiograms prove.

Fig. 3.—Hindu ryot, 23, investigation, case no. 61—

(*a*) 23rd December, 1941—red cells 1,240,000; hæmoglobin 12 per cent; blood pressure 100/55; heart measurements (orthodiagram): ml. 12, mr. 9.5; trans. diam. 21.5 cm.; cardiogram: S-T junctions in leads II and III downwards convex; T waves absent (isoelectric) in all leads; these signs prove a severe myocardial lesion.

* The size of the orthodiagrams, used for reproduction, was reduced photographically to maintain exactly the natural proportions.

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HEART IMPROVEMENT ACCOMPANYING IMPROVED BLOOD CONDITION WITHOUT DEWORMING.

I. II. III. IV. (back to apex beat)

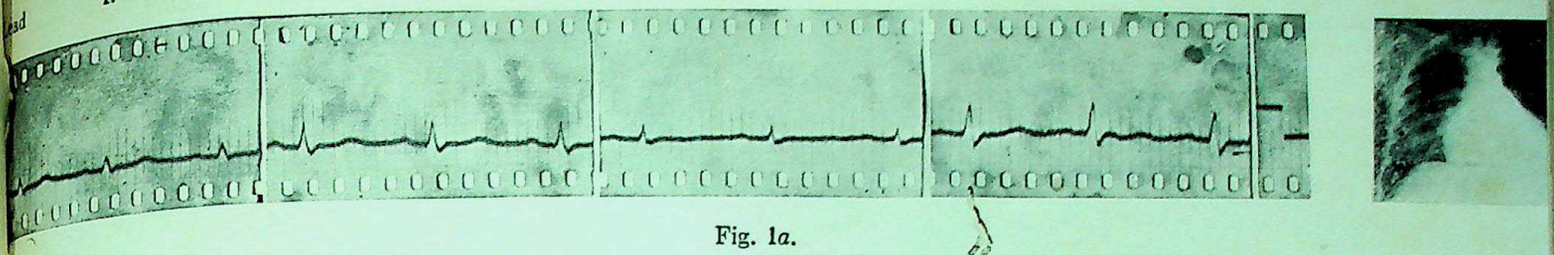

Fig. 1*a*.

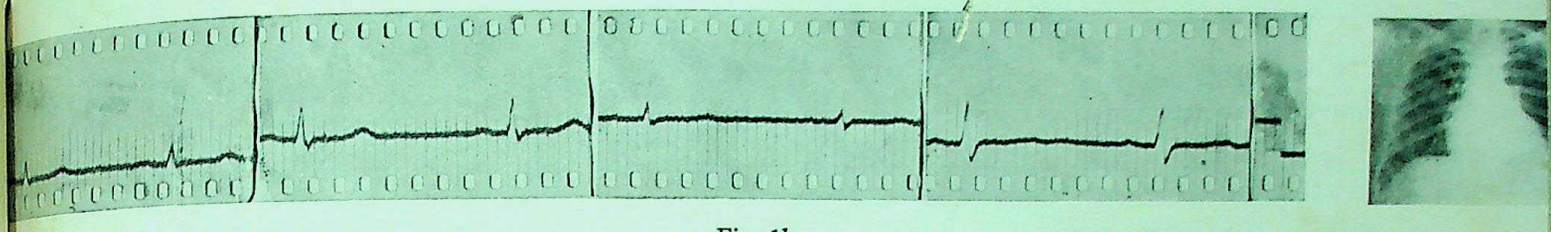

Fig. 1*b*.

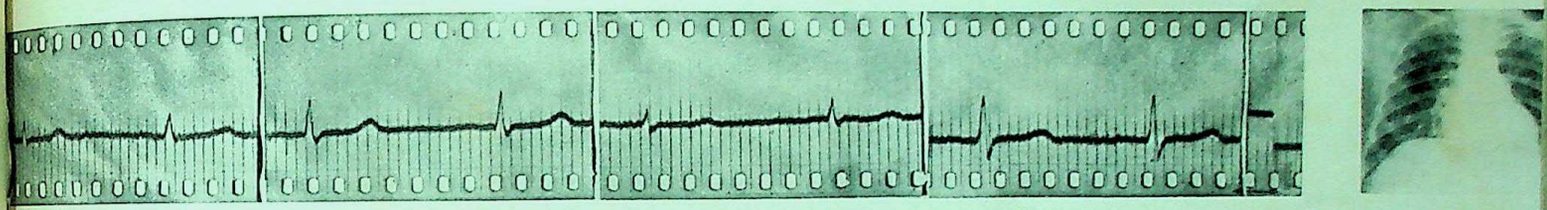

Fig. 1*c*.

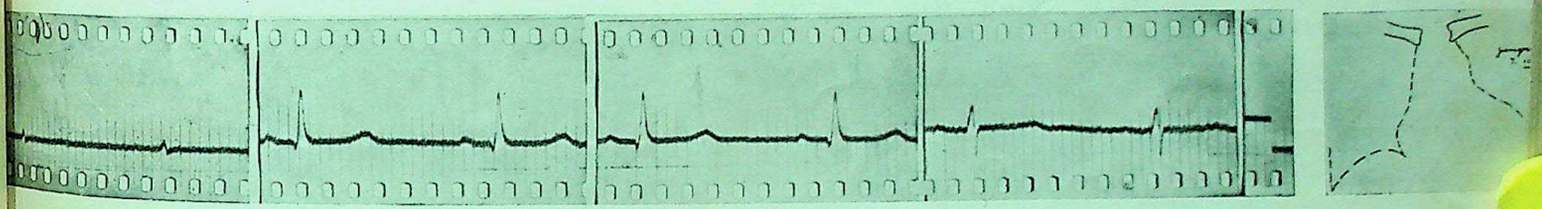

Fig. 2*a*.

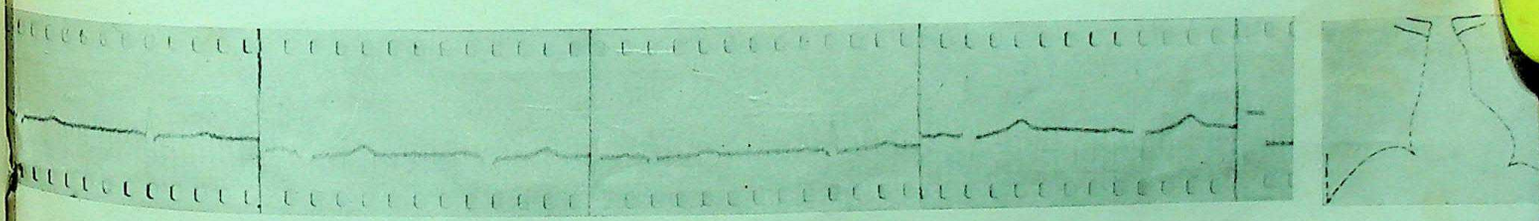

Fig. 2*b*.

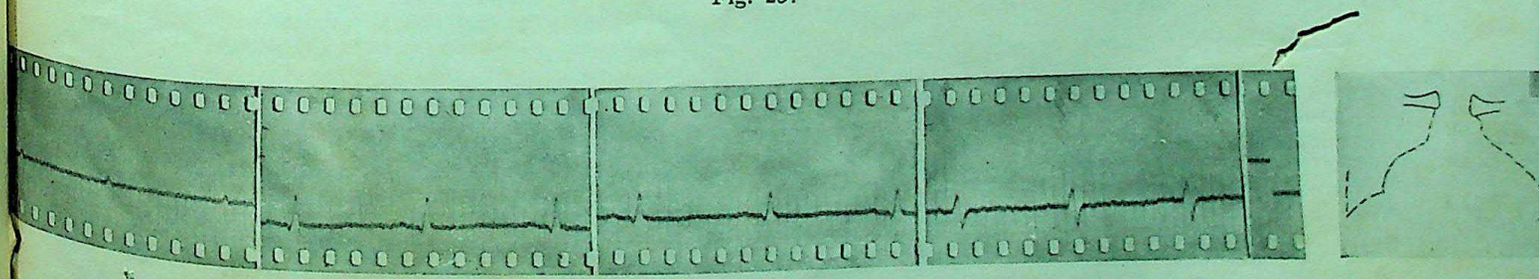

Fig. 3*a*.

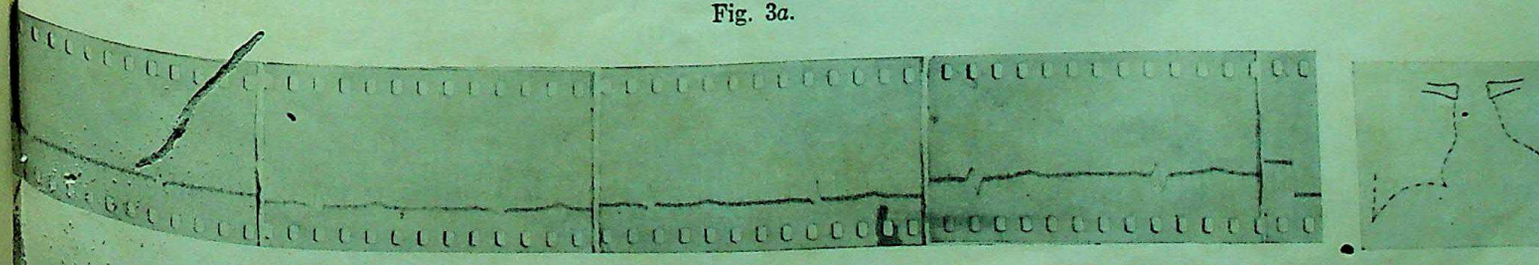

Fig. 3*b*.

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Plate VIII

I. II. III. IV. (back to apex beat)

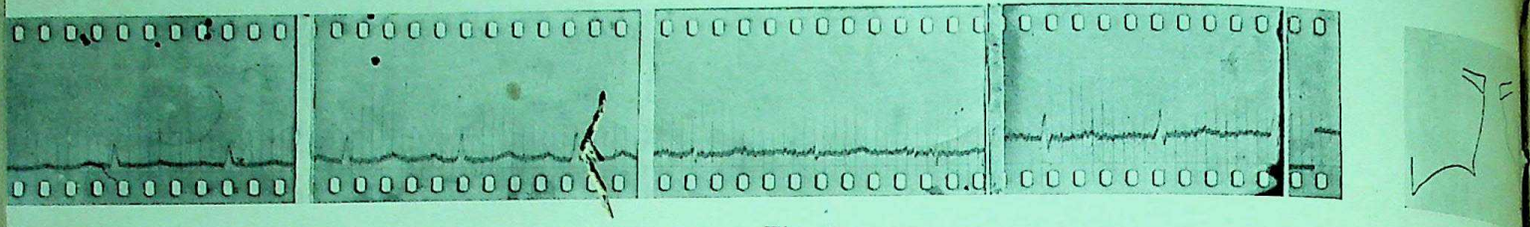

Fig. 4*a*.

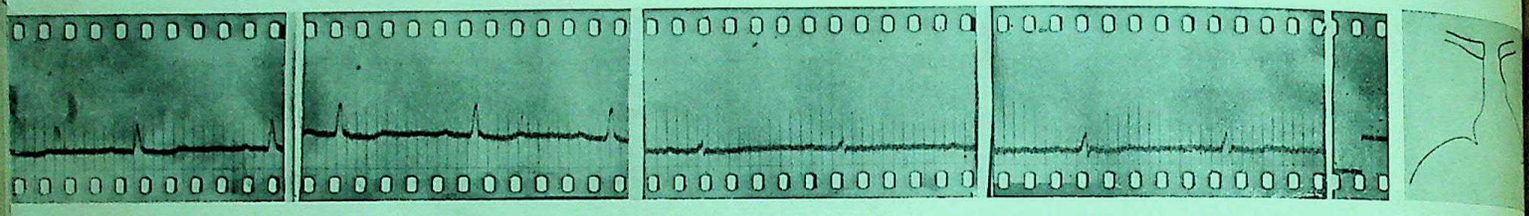

Fig. 4*b*.

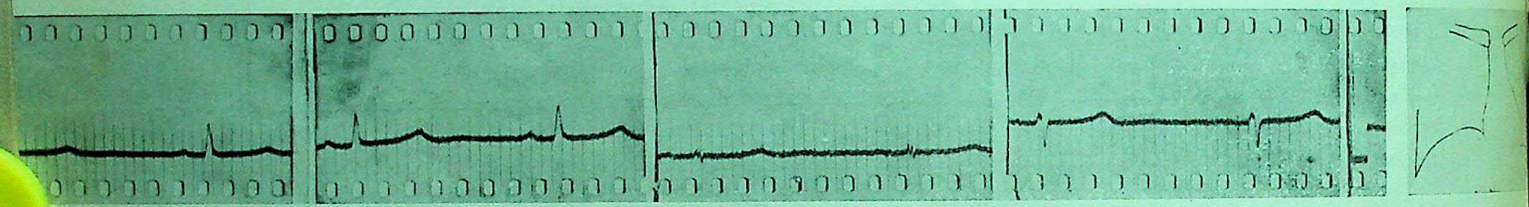

Fig. 4*c*.

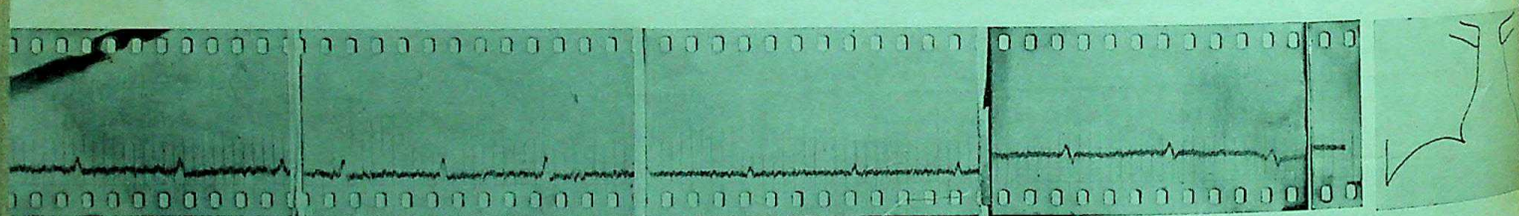

Fig. 5*a*.

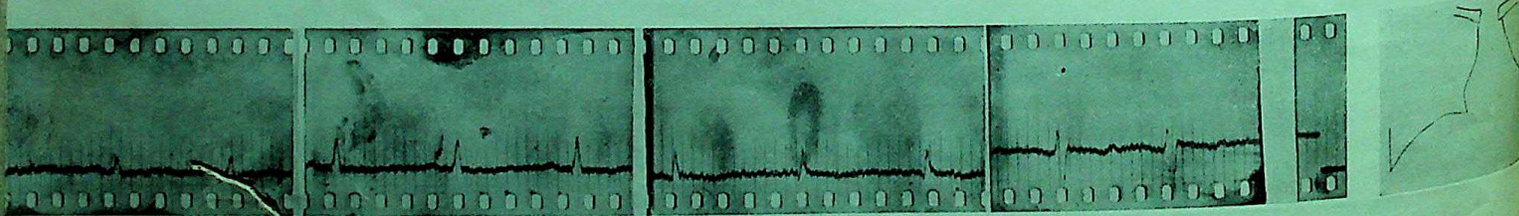

Fig. 5*b*.

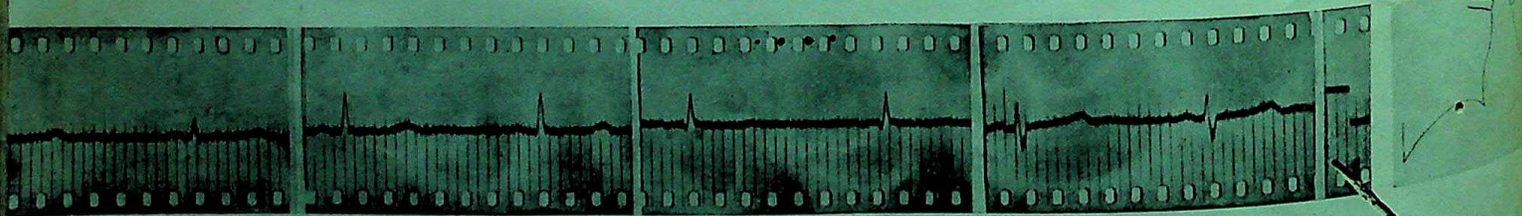

Fig. 5*c*.

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(*b*) 12th January, 1942—red cells 3,120,000; hæmoglobin 36 per cent; blood pressure 110/70; heart measurements: ml. 10, mr. 5.4; trans. diam. 15.4 cm.; cardiogram : increased voltage in leads II and III; the previously pathological S-T junctions are straight; the previously absent T waves became highly positive in leads II and III, positive in IV; T1 is still hardly visible, but it can never become much higher because of the constitutionally low R1. The signs of a myocardial damage disappeared.

16th January—hæmoglobin 40 per cent; carbon tetrachloride + oil of chenopodium were administered and hundreds of worms passed.

Hardly three weeks of anti-anæmic treatment increased the red cells count by 2,100,000, trebled the hæmoglobin content, reduced the heart transverse diameter by 6.1 cm. (!) and improved the cardiogram amazingly.

Discussion

It may be mentioned that simultaneously with the writing of every cardiogram, the standardization is recorded; it is reproduced at the end of the respective cardiograms on the plate, thus proving that the voltage of the cardiograph (Siemens) was constant and the changes were due to the altered myocardial condition only.

Simultaneously with these rapid changes of the cardiographic, radiological and blood picture, the pathological heart signs on palpation and auscultation disappear. The slapping, rapidly vanishing, displaced apex beat, which is due to the diminished filling of the dilated left ventricle, moves in the normal area and, if distinctly palpable, becomes normal in character; the corresponding first sound loses the abnormal accentuation.

In many cases the systolic murmur in the mitral area disappears entirely when the size of the left ventricle and the pulse rate have been normalized; it owes its existence to two factors, the increased velocity of the blood stream (Porter, 1937), which is a consequence of the severe anæmia, and, most probably, to a relative mitral insufficiency, which necessarily develops with the dilatation of the flabby left ventricle, to which the valvular ring yields easily.

The systolic murmur in the pulmonary area becomes fainter and finally inaudible with complete recovery; it results probably from a functional supravalvular pulmonary stenosis, produced by the compression of the pulmonary artery between the dilated right ventricle and the chest wall; with the reduction of the ventricle to normal size, the compression ceases and the murmur disappears.* Similarly the palpable closure of the pulmonary valve and the accentuation of the pulmonary second sound are not more perceptible; they have been due to the fact that the dilated right ventricle approaches the pulmonary artery closer to the thoracic wall so that the closure of the pulmonary valve is better conducted. Another sign that the right ventricle has reached normal size is the disappearance of the epigastric pulsation. The typical convalescence bradycardia and the rise of the blood pressure have been mentioned already.

Œdema.—The œdema is absorbed in many cases with the improved blood condition, due most probably to the increased protein content of the blood plasma. To eliminate an ascites in hookworm disease we found ammonium chloride grs. xv with calcium chloride grs. x three to five times a day, combined with urea, drachms v three times a day, by far the most effective and harmless diuretic (Heilig, 1941).

Only 90 per cent of our cases responded in this way to anti-anæmic treatment, before deworming was performed. *Six cases,* women all of them, *behaved differently.*

Exceptions.—The findings on admission as well as the treatment have been identical with those outlined before, but in spite of an equally rapid improvement of the blood condition the heart size did not diminish, the cardiogram showed no improvement; on the contrary it was sometimes worse at a hæmoglobin level of 50 than at 15 per cent, the physical heart signs remained almost uninfluenced in spite of a most satisfactory increase of red cells and hæmoglobin. All the pathological heart signs disappeared soon after anthelminthic treatment was effectively performed; *complete* deworming was the requisite for an improvement of the heart condition. In two of these cases where the first administration of carbon tetrachloride left about a hundred worms behind, the further deterioration of the cardiogram indicated the necessity to repeat the deworming in spite of a further increase of the hæmoglobin level to 67 and 70 per cent respectively. Figures 4 and 5 (plate VIII) are typical representatives of this small but important group :—

Fig. 4.—Female, 25 years—

(*a*) 4th December, 1941—red cells 1,570,000 per c.mm.; hæmoglobin 12 per cent. Transverse diameter of heart 15 cm.; electrocardiogram: low voltage; T waves flat.

(*b*) 8th January, 1942—red cells 3,800,000 per c.mm.; hæmoglobin 52 per cent. Transverse diameter of heart 14.5 cm.; electrocardiogram: S-T junction convex downwards (I and II); T waves almost disappeared.

There was no heart improvement (before deworming) in spite of considerable improvement of the blood condition.

(*c*) 21st January—ten days after deworming red cells 3,950,000 per c.mm.; hæmoglobin 57 per cent. Transverse diameter 11 cm.; electrocardiogram : voltage increased; T waves almost normal.

Fig. 5.—Female, 45 years—

(*a*) 4th December, 1941—red cells 1,350,000 per c.mm.; hæmoglobin 10 per cent. Transverse diameter 14.5 cm.; electrocardiogram: voltage low; T waves absent.

(*b*) 5th January, 1942—red cells 3,560,000 per c.mm.; hæmoglobin 40 per cent. Transverse diameter 14.5 cm.; electrocardiogram: voltage increased in II—

*Several authors noticed a diastolic murmur in various localizations left of the sternum; the description, given by P. C. Gupta (1941), especially in his case 10, where the second sound was absent in the area of this murmur, makes the following explanation probable: the diastolic murmur is of the same origin as Graham Steell's murmur in mitral stenosis; it is due to a relative pulmonary incompetence, consequent upon a considerable dilatation of the right ventricle and pulmonary cone, which causes a stretching of the pulmonary ring to such an extent that the normal pulmonary valve cusps are not able to shut it during diastole.

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IV; but S-T convex downward in II and III; TI—TIII absent; TIV biphasic.

(*c*) 12th January, 1942—after complete deworming on 5th January without further anti-anæmic treatment: red cells 3,800,000 per c.mm.; hæmoglobin 45 per cent. Transverse diameter 11 cm.; electrocardiogram: normal in every respect.

These cases show clearly how the blood condition quickly improved, as in all the other cases, but the heart size and configuration remain unaltered. The measurements of the orthodiagrams (*a*) and (*b*) in figures 4 and 5, respectively, are the same and the cardiograms prove a progressing deterioration of the heart muscle, expressed by the pathological shape of the S-T junctions and by increasing flattening or even inversion of the T waves. As none of these patients received any other remedy but iron, especially, of course, no digitalis, and as all the patients under investigation have been constantly afebrile, the change in the T waves points unequivocally towards further myocardial degeneration due to the prolonged hookworm infestation. The whole picture changes quickly after complete deworming; the orthodiagrams (*c*) in figures 4 and 5 and the cardiograms, reproduced alongside of them, leave no doubt that complete restoration of the physiological heart condition in these cases follows and is due to the destruction of the hookworms and could not be achieved by improvement of the blood condition only. To exclude any other factor responsible for this improvement, the iron medication was stopped when deworming was achieved.

Discussion

The severe hookworm infestation of a high percentage of the population in India confronts health departments with problems of eminently practical importance—that of prevention and mass treatment. All data necessary for successfully combating this public enemy have been discovered or completed in this country by Chandler (1927, 1929), Sweet (1929), Napier (1937), Napier and Das Gupta (1935*a*, 1936), Maplestone and Mukerji (1929). The main trend of clinical research swing towards the investigation and elucidation of the factors causing hookworm anæmia and establishing the best method of dealing with it in view of the final aim—the eradication of the worm infestation. The result of this research work is that the only economically reasonable and medically safe method of hookworm treatment is to treat the anæmia (with iron) first, until a hæmoglobin value of 40 per cent is achieved, and to deworm the patient with carbon tetrachloride or better with tetrachlorethylene (Maplestone and Mukerji, 1929) afterwards.

This method was worked out by Napier and Das Gupta (1935) in the tea gardens of Assam (Napier and Das Gupta, 1937; Napier, 1937); it was based on the fundamental fact, discovered by these investigators and by Rhoads, *et al.* (1934), that iron cures hookworm anæmia in spite of a persistent heavy hookworm infestation. The same kind of treatment was used and the excellent results confirmed in hundreds of such cases by Payne and Payne (1940), and Heilig (1941).

The generally accepted opinion as to the cause of hookworm anæmia was therefore that it develops consequently the constant loss of blood, due to the blood-sucking action of the hookworms, and to the simultaneous loss of iron, thus representing a true secondary, iron-deficiency anæmia. The importance or even the existence of a specific hookworm toxin remains doubtful (Napier, Das Gupta and Majumdar, 1941). The other typical manifestation of hookworm disease, the pathological heart condition, attracted less attention during the last decade; in the literature available to us, only one paper was partly concerned with the investigation of the influence of ancylostomiasis on the heart with modern methods (Porter, 1937); the mere clinical observations on auscultatory phenomena (Gunewardene, 1933, 1935) may be only mentioned here.

Porter examined in eighteen patients, suffering from hookworm anæmia, several factors, such as blood velocity, vital capacity, etc., which contribute to compensate the disadvantageous conditions caused by the anæmia. Among other findings, he noticed in all these cases an increased heart size which in some of them was diminished when the hæmoglobin level rose; in others, it remained unchanged in spite of an increased hæmoglobin content. He concludes from these findings that the anæmia causes an initial compensatory dilatation which leads after some time to an irreversible hypertrophy, a theory contrary to all clinical experience which always shows that, if hypertrophy is present at all, it precedes dilatation. The question whether these heart dilatations, which persist in spite of anti-anæmic treatment, would yield to anthelminthic treatment is not even touched; no deworming was attempted in the course of these investigations.

The author took cardiograms only *before* the anti-anæmic treatment was started and not during or after treatment, apparently because he did not find any pathological changes referable to hookworm anæmia; this is certainly due to the fact that those degrees of anæmia and malnutrition, which we find here almost always on admission, are unknown in the U. S. A. Therefore, Porter's—otherwise interesting—observations do not contribute to the solution of our problem, whether the pathological heart conditions, regularly present in severe hookworm disease, are due to anæmia only or to other factors apart from it.

The reported clinical, radiological and especially electrocardiographic findings of our investigation prove that those degrees of hookworm infestation which lead to a severe anæmia are regularly accompanied by a serious, diffuse, myocardial lesion which causes a general dilatation of the heart. The fact that all objective

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signs of this heart muscle weakness respond well to anti-anæmic (iron) treatment without deworming in about 90 per cent of our cases, makes it probable that in the majority of ancylostomiasis cases the myocardial lesion is due to the anoxia which is a necessary consequence of such severe hæmoglobin deficiencies. On the other hand, six of our female cases showed no improvement of their heart condition in spite of an excellent blood response to the anti-anæmic treatment; the signs of cardiac damage subsided only when complete deworming was achieved. The myocardial lesion in this small group was apparently due not to the metabolic changes of anæmic origin, but to the presence of the hookworms. In these cases, at least, the hookworms display two different actions, which have not been distinguished previously. One of them causes the microcytic, hypochromic anæmia; this action can be always over-compensated by the supply of massive doses of iron. The other causes a severe myocardial lesion; the only way to cure it is by the elimination of the causative agent, the hookworm. We tried to determine in one of these cases whether high doses of vitamin B_1 (Berin, Glaxo, 200 mg. in 20 days) would improve the myocardial condition, following the suggestion of McKenzie (1939) and Hoff and Shaby (1939) that certain pathological conditions in ancylostomiasis are due to vitamin-B_1 deficiency; at the end of this course the cardiogram showed a further deterioration; deworming was followed soon by a definite improvement also in this case. It is not possible to decide whether the refractory reaction of the heart muscle towards anti-anæmic treatment is due to a qualitatively or quantitatively different action of the hookworms or to an abnormal sensitiveness of the myocardium in this minority group, compared with the vast majority of cases.

Conclusion

The observations on 65 cases of uncomplicated, afebrile, severe hookworm disease, reported and discussed above, make it certain that the pathological heart signs, which are typical for this condition, are due to a diffuse myocardial damage, which leads to a considerable dilatation of the left and the right heart; the murmurs are not 'hæmic' murmurs only but also, most probably, consequences of a functional, supravalvular pulmonary stenosis and a relative mitral insufficiency, caused by the dilatation. In 90 per cent of these cases all the signs of myocardial degeneration and dilatation vanished quickly and almost completely in strict parallelism with the improvement of the erythrocyte count and hæmoglobin level, in spite of the untreated and persisting hookworm infestation. Six cases showed no change of the pathological heart condition before deworming, though the hæmoglobin level rose from values of 10 to 15 per cent Sahli on admission, to 40 to 60 per cent before anthelminthic treatment was started; in these cases the heart dilatation and myocardial lesion improved quickly after complete destruction of the hookworms. These facts seem to prove that two factors are responsible for the heart damage in ancylostomiasis, the anæmia and a toxic agent, dependent on the presence of the hookworm; in the majority of cases it is possible to compensate (temporarily ?) the action of the second factor by curing the anæmia, but a minority remains where this factor is predominant and exerts its myocardial damaging influence irrespective of the blood condition. We cannot decide whether this agent is a toxin or an allergin; the eosinophilia, said to be found frequently in ancylostomiasis, points towards the second possibility. However, complete elimination of the hookworms has to follow the anti-anæmic treatment, preferably succeeded by prolonged iron-medication, to get optimum and lasting results.

Summary

Sixty-five cases of severe hookworm disease have been investigated during anti-anæmic and anthelminthic treatment.

The red blood cell count, hæmoglobin level, clinical, radiological and electrocardiographic findings have been recorded at weekly intervals.

The factors responsible for the pathological heart condition have been discussed.

My sincere thanks are due to our radiologist, Dr. A. C. Devaraj, and to his assistants Messrs. Mohamed Aga and Venkatarangiah, who have spent many hours in tracing the orthodiagrams in the most exact way, and to my assistant Mr. Visweswar, M.B., B.S., who rendered valuable help in many ways.

REFERENCES

CHANDLER, A. C. (1927). *Indian J. Med. Res.*, **15**, 159.
Idem (1929). *Hookworm Disease.* Macmillan and Co., Ltd., London.
GUNEWARDENE, H. O. (1933). *J. Trop. Med. and Hyg.*, **36**, 49.
Idem (1935) .. *Heart Disease in the Tropics.* Butterworth and Co., Ltd., Calcutta.
GUPTA, P. C. (1941) .. *Indian Med. Gaz.*, **76**, 392.
HEILIG, R. (1941) .. *Ibid.*, **76**, 519.
HOFF, H., and SHABY, J. A. (1939). *J. Trop. Med. and Hyg.*, **42**, 157 and 360.
MAPLESTONE, P. A., and MUKERJI, A. K. (1929). *Indian Med. Gaz.*, **64**, 424.
McKENZIE, A. (1939) .. *Lancet*, *i*, 1143.
NAPIER, L. E. (1937) .. *Indian Med. Gaz.*, **72**, 270.
NAPIER, L. E., and DAS GUPTA, C. R. (1935). *Indian J. Med. Res.*, **22**, 809.
Idem (1935*a*). *Ibid.*, **23**, 305, 311 and 455.
Idem (1936). *Ibid.*, **23**, 973.
Idem (1937). *Ibid.*, **24**, 855 and 1159.
NAPIER, L. E., DAS GUPTA, C. R., and MAJUMDAR, D. N. (1941). *Indian Med. Gaz.*, **76**, 1.
PAYNE, G. C., and PAYNE, F. K. (1940). *Amer. J. Hyg., Sec. D.*, **32**, 125.
PORTER, W. B. (1937) .. *Amer. Heart J.*, **13**, 550.
RHOADS, C. P., CASTLE, W. B., PAYNE, G. C., and LAWSON, H. A. (1934). *Medicine*, **13**, 317.
SWEET, W. C. (1929) .. *Mysore Dept. of Health Bull.*, No. 7. Govt. Press, Bangalore.

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LUNG ABSCESS

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ABSCESS of the lung is aptly defined by Maxwell (1934) as 'non-tuberculous suppuration with cavitation occurring in the lung tissue'. Nowadays, it is generally agreed that abscess and gangrene of the lung clinically are different stages of the same pathological process which is likely to appear under certain conditions. The stage of the suppurative process will depend upon the virulence of the infection and resistance offered by the patient. Thus, when the infection is highly virulent and the patient is debilitated, he is likely to develop gangrene; while if the infection is mild and the resistance of the patient good, he will probably have the comparatively localized intra-pulmonary suppuration called the abscess of the lung.

The purpose of this paper is to report the findings of the study of 53 consecutive case-records of lung abscess that were admitted in Sir J. J. Hospital, Bombay, during the last six years, from 1936 onwards.

The condition is known from ancient times, but it seems that with increased facilities at our disposal for its diagnosis and careful clinical observation has led us to suppose that it is occurring more commonly these days than before. The increase is not real but only apparent. The diagnosis is helped very much by the radiological examination of the chest which has now come to be a routine in chest cases wherever it is available. Thus, the yearly incidence in the present series was as given in the table below :—

1936	1937	1938	1939	1940	1941 (up to Oct.)
3	6	10	14	7	13

One can only say that we are more correctly diagnosing lung abscesses nowadays than before. This series includes all cases of non-tuberculous intra-pulmonary suppuration, and so the abscesses secondary to new growth and bronchiectasis are not excluded from these.

Ætiology

Age.—Abscess of the lung can occur at any age from infancy to old age. The present series includes patients only above 13 years of age and the incidence was as follows :—

10–20	20–30	30–40	40–50	50–60	60–70
1	10	17	17	5	3

The youngest patient in this series was 14 years of age and the oldest was 66 years. The maximum incidence (64 per cent) was found from 30 to 50 years.

Sex incidence.—The abscess of the lung is more common in males than in females. There were 50 males and only 3 females in the present series.

The lung abscess commonly occurs either as a post-operative complication or as a result of inflammation of the lung. Rarely, it may occur secondarily to chest injury, actinomycosis, amœbiasis, pneumonokoniosis or new growth. Regarding the pathogenesis of post-operative abscess there are two schools of thought. One thinks that the aspiration of the septic material during operations on the upper respiratory passages plays the chief rôle in the causation of lung abscess, whilst the other thinks the embolic phenomena to be the chief mechanism. The operation chiefly blamed is tonsillectomy. Maxwell (*loc. cit.*) has reported that lung abscesses occur frequently after abdominal operations also. In a recent paper, Shah (1939) found only 4 cases out of 50 as due to aspiration and embolism. Taylor *et al.* (1940) while reporting 7 cases of lung abscess support the contention that post-operative lung abscesses are seen to be much less in this country. Fisher and Finney (1940) found that only 15 per cent of 88 cases of lung abscess could be attributed to post-operative complications, whilst pneumonia, broncho-pneumonia and upper respiratory infections were responsible for 49 per cent of the cases in the above-mentioned series. Shah also found that the incidence of abscesses secondary to pneumonia, broncho-pneumonia and respiratory infections was 42 per cent in his series of 50 cases.

In the present series the incidence was as given below :—

	Cases
Pneumonia, broncho-pneumonia, bronchitis, influenza.	20 (37 per cent)
Unknown (preceding conditions not known, symptoms of lung abscess presenting first).	31 (58 per cent)
Trauma	1 (2 per cent)
Embolism (after septic abortion)	1 (2 per cent)

The findings in this series support the observations of Shah (*loc. cit.*) and Taylor *et al.* (*loc. cit.*). The maximum incidence was found to be of so-called primary lung abscess. In this series there was not a single case wherein previous history of surgical operations was elicited.

Location of abscess.—It is a general belief that abscess is more common on the right side than on the left, and that it is commoner in the lower lobe than in the upper lobe. This is well supported by reports in the literature. In

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the present series the distribution was as given below :—

Right upper lobe ..	13	Left upper lobe ..	5
Right middle lobe	4	Left middle lobe ..	1
Right lower lobe ..	15	Left lower lobe ..	11
	32		17

Two patients had gangrene of the lung with multiple opacities, both sides without any cavitation, and two others died before the radiological examination could be done.

Onset.—The mode of onset will depend upon the ætiology of the abscess. In embolic abscesses the onset is likely to be sudden. In aspiration cases the symptoms generally appear within 6 to 7 days after the operation on the upper respiratory passage. In post-pneumonic abscess the temperature does not come down to normal by crisis within the usual period and assumes an intermittent character. The onset is generally insidious and the patient has a cough with expectoration and fever. Later on, the patient complains of an unpleasant taste in the mouth and a foul smell of the breath. In some cases there is pain of the pleural type in the chest; this is often of localizing value. There may be hæmoptysis—just tinging of the sputum. The sputum when collected in a conical glass assumes the characteristic three layers—upper frothy, the middle turbid, and the lower composed of thick purulent material. The foul smell is often the earliest symptom observed either by the patient himself or the relatives. The fever in acute cases comes with rigor, and is high and intermittent. Later, when the abscess is partially open to the bronchus, it assumes an irregular character. The cough is often paroxysmal and is brought on by change of posture. In the present series, cough with expectoration was present in all cases. Fever as a presenting symptom was found in 37 cases (69 per cent), pain in chest in 20 cases (37 per cent), foul smelling expectoration in 34 cases (64 per cent), and hæmoptysis in 9 cases (17 per cent).

Physical signs.—Physical signs are often few and will depend upon the situation of the abscess and on the extent of the surrounding consolidation. If the abscess is superficial, there will be signs of consolidation first, *e.g.*, impaired note on percussion and diminished or bronchial breath sounds with few foreign sounds, and later on, when it is in connection with the bronchus, there may be signs of cavitation if the cavity is empty, superficial and of fairly large size, *e.g.*, impaired note on percussion, cavernous breath sounds, and metallic râles. Generally there is leucocytosis from 12,000 to 20,000 per c.mm. The sputum examination shows streptococci, staphylococci, pneumococci and besides these there may be *B. fusiformis* and Vincent's spirochæte. Elastic tissue is frequently found in the sputum. On radiological examination during the early stages of suppurative pneumonitis, there will be opacity in the lung fields which may simulate lobar pneumonia. The opacity is not homogeneous but patchy and there may be thickening of the pleura over it. Later still, as the lung tissue breaks down and liquefies, a cavity with fluid level becomes apparent. Sometimes this is shown in lateral radiogram only and so it is necessary in suspected cases to have both the antero-posterior and lateral radiograms. Iodised oil if injected generally does not enter the cavity. It may prove useful in diagnosing the bronchiectatic abscess and the abscess formed distal to bronchial carcinoma.

In the present series physical signs were vague as diminished air entry and few foreign sounds at one base in 29 cases, signs of consolidation were present in 22 cases and signs of cavity were found only in 3 cases; clubbing of the fingers was present in 10 cases. Leucocytic count was done in 34 cases; it was above 15,000 per c.mm. in 10 cases, from 5,000 to 15,000 per c.mm. in 22 cases and less than 5,000 in 2 cases. Sputum examination was done in 47 cases out of 53 and was negative to acid-fast organisms in all with repeated observation by the antiformin method of concentration. In the majority of cases, a stained film showed streptococci, staphylococci and pneumococci. In 2 cases only Vincent's organisms were detected. The Wassermann reaction was positive in 3 cases.

Diagnosis.—Diagnosis of lung abscess chiefly rests upon the considerations of all the factors collectively as symptoms, physical signs and the result of radiological investigations. New growth of the bronchus will be difficult to exclude since abscess often co-exists distal to the growth, but investigation with lipiodol and the bronchoscopic examination will help to prove the real nature of the condition. It will often be difficult to distinguish clinically between the abscess at an early stage from the pneumonic consolidation. Inter-lobar empyema will have to be excluded.

Duration.—The duration of the illness before admission is held by many to be of great prognostic significance. Thus, Fisher and Finney (*loc. cit.*) mention King and Lord's observations that short durations influence favourably towards spontaneous recovery and they also support this by their figures in 88 cases. In the present series, excluding one case where there was a history of illness for one year before admission which is likely to be incorrect, the duration varied from 3 days to 120 days. It was less than 10 days in 17 cases (6 deaths, 35 per cent) and more than 10 days in 36 cases (15 deaths, 41 per cent). The mean average duration of illness before admission in the present series was 30 days. From this it can be seen that patients whose illness before admission exceeded 10 days had a slightly higher mortality than those whose history of illness was less than 10 days before admission. The stay in hospital

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varied from 2 hours to 130 days, the average being 27 days.

Results.—The average mortality for lung abscess still ranges from 30 to 40 per cent for cases treated with combined procedures—medical and surgical. In the present series of 53 cases, 23 patients were discharged much improved clinically and radiologically. There were 21 deaths (39 per cent). Nine patients were discharged at request against medical advice.

Associated conditions.—Four patients had diabetes mellitus. Two suffered from acute bacillary dysentery while under treatment for abscess lung. Two had chronic diarrhœa, without blood and mucus in the stools. Two patients had empyema along with the abscess. One had severe anæmia and in one there was suspicion of new-growth of the bronchus.

Treatment

Every case of lung abscess should be given expectant medical treatment from 4 to 6 weeks before any surgical procedure is contemplated, because there is a definite tendency to spontaneous recovery in a certain number of cases and the medical treatment in the form of rest, postural drainage and drug treatment may help this natural tendency.

Complete rest in bed assists in building up the resistance of the patient. He should have plenty of fresh air without exposure to draught and should have good appetizing, nourishing, high-vitamin diet.

Postural drainage.—As soon as the diagnosis is confirmed, the location of the abscess should be decided by radiological examination, and, taking into consideration the situation of the abscess, the patient should be encouraged to assume the special posture as required. There is a special bed devised for this purpose by Nelson. If this bed is not available, simple bending over the bed is often useful. An abscess in the upper zone can be drained with the patient sitting well propped up. In an abscess in lower zone, the patient should be asked to bend over the bed, with the palms of the hand supporting him on the ground. Often the suitable position for drainage is found out by the patient himself by experimenting. The drainage should be done gradually, five minutes morning and evening, increasing the time slowly.

Drug treatment.—French writers first advocated this therapy consisting of intravenous injection of 5 c.cm. of 33 per cent alcohol daily, and they reported good results. But English physicians have not found this to be very useful and Edwards (1938) thinks that the claims made are not substantiated.

In the present series, this therapy was used in 43 cases, but unfortunately the value of it cannot be assessed as some other form of treatment was also used at the same time.

French writers have also reported good results with daily intravenous injection of sodium benzoate, 20 c.cm. of 20 per cent solution.

On the supposition that Vincent's spirochætes are often present in the sputum in these cases, arsenic, either in the form of sulpharsenol or neoarsphenamine, is given once a week in small doses parenterally.

Recently, Taylor *et al.* (*loc. cit.*) have found marked improvement by M.&B. 693 in 3 cases out of 7. Fisher and Finney (*loc. cit.*) found sulphanilamide beneficial in one case of lung abscess. Taking into consideration the fact that this group of drugs having proved ineffectual against anærobic organisms, they think that these will not add much to the therapy of chronic lung abscess at least. In the present series 8 cases were given this group of drugs, either orally in the form of M.&B. 693 or in the form of injections of soluseptasine; out of these 5 patients ultimately died. In 3 cases the patients improved comparatively early, but taking into consideration the natural history of the disease and in absence of a control group, it seems rather over-optimism to attribute these successes to particular drug therapy only.

Surgical treatment.—Artificial pneumothorax treatment was used in abscesses in early days and it was found that this procedure as a routine treatment in lung abscess is dangerous, the chief risk being rupture of the abscess into the pleura giving rise to pyo-pneumothorax with ultimate high mortality. Thus, Roberts (1936) mentions 11 cases treated by artificial pneumothorax treatment. Nine cases developed acute pyo-pneumothorax and 5 died. He thinks the risk is too much. Maxwell (*loc. cit.*) suggests that it should be useful in abscess deeply situated and in connection with a bronchus.

Bronchoscopic aspiration is found useful where there is definite history of a foreign body.

The most recognized procedure nowadays is thoracotomy. The operation is done in two stages; at first the pleura is made adherent by packing and then the abscess is drained through this adherent pleura.

With these combined medical and surgical procedures the mortality is becoming less and less recently.

Summary

1. Analysis of 53 case-records of lung abscess is presented. They were studied chiefly from the clinical aspect of the disease and with a view to finding out the common ætiological factors.

2. The series showed 39 per cent mortality. None of the cases followed surgical operation. In the majority there was no previous history of any respiratory infection. Respiratory infections accounted for 37 per cent of the cases only. The abscess was on the right side in 60 per cent of the cases.

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CONGENITAL CYSTIC BRONCHIECTASIS

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Nomenclature.—Cyst-like cavities are sometimes found in the lungs, without the presence of any previous infection to account for them. They are evidently congenital in origin. There is a wide divergence of opinion regarding the nomenclature of this abnormality. Oechsli and Miles (1934) attempt to differentiate between cystic bronchiectasis and congenital cystic disease of the lung by invoking the presence or absence of cartilage in the cyst walls. Koontz (1925) uses the terms 'honey-comb lung', congenital cystic disease of the lung, congenital bronchiectasis and fœtal bronchiectasis synonymously, and states that all types exhibit the histology of the bronchus in their epithelial lining, smooth muscle, and cartilage. King and Harris (1937) and Oughterson and Taffel (1936) agree as to the histological picture found in all the cases. Carr (1891) used the term bronchiolectasis to indicate that the pathological changes in his cases were limited to the bronchioles. In the light of recent knowledge they would be considered as typical examples of cystic or honey-comb lung. Sharpe (1940) prefers to adopt a new nomenclature, namely, 'congenital cystic malformation of the lungs', to show that it is a form of congenital abnormality and not an inflammatory reaction. Though Sellors (1938) considers 'congenital cystic disease of the bronchi' as a more accurate designation, he prefers to keep to the term 'congenital cystic disease of the lung' as it has been commonly accepted in English-speaking countries. Norris and Landis (1933), after a critical evaluation of the evidence available, arrive at the conclusion that, pathologically at least, all types of so-called 'congenital cystic disease of the lung', solitary or multiple, with the possible exception of those that appear as emphysematous subpleural blebs, are in reality examples of 'congenital fœtal cystic bronchiectasis'. In view of the fact that it is impossible to make a clinical differentiation between congenital cystic lung and cystic bronchiectasis in the cases reported as such, and because of the presence of bronchial tissue in the walls of the cysts found in the few cases wherein autopsy had been made, one would be justified in adopting the term congenital cystic bronchiectasis.

It is not within the scope of this paper to discuss the acquired varieties of cyst-like cavities, which might either be saccular dilatations of the bronchioles or bullous emphysemata of the lung parenchyma. In this connection, Caffey's (1940) studies in regional pulmonary obstructive emphysema in infants and children, coming on during or after an attack of pneumonia, are of interest. Ring shadows in the bases of the lungs seen after infection, which Andrus (1940) calls 'pulmonectasis' or localized pulmonary over distention, can be classed as acquired cysts of the lung substance.

Incidence.—Carruthers (1940) speaks of Bartholinus as having reported the first case in 1687. Laennec (1846), in his classical *Treatise on Diseases of Heart and Lungs*, makes reference to Bonet (1620–1689), Morgagni, van Swieten, and Valsalva (Laennec, *loc. cit.*), who have reported cases with large cysts in the lung. Koontz (*loc. cit.*) was the first to assemble all the available records in the literature, numbering 108 in all. This gave the necessary impetus for the recognition and collection of a series of new cases by others, thereby furnishing another example of a presumably rare disease becoming much more frequent when the primary impetus is supplied, to observe and report it. King and Harris (*loc. cit.*) tabulated 152 additional cases, reported in the last decade. Sellors (*loc. cit.*) with his 32 new cases brings the total to well over 400. The 15 cases reported below are undoubted examples of congenital cystic bronchiectasis, having been selected out of 300 cases of chronic non-tuberculous lung conditions wherein lipiodol bronchography was done as a routine measure.

Ætiology.—The mechanism by which cysts form in the lungs congenitally has been a matter of great speculation. The very existence of numerous theories and explanations is in itself a confession of our inability to arrive at the correct solution to the problem. The original conception dates back to 1880, when Grawitz published his account of 8 cases. He divided them into universal and telangiectatic bronchiectasis and regarded the cysts as being dilated bronchi distended by a collection of fluid. Obviously the explanation is wrong, as it is difficult to understand how dilatation could be caused by accumulation of fluid in open tubes. Klebs, seeing marked hypertrophy of endothelial

(*Continued from previous page*)

3. Medical and surgical treatment is briefly reviewed

Acknowledgment.—I am thankful to Colonel J. M. Shah, I.M.S., Superintendent, Sir J. J. Hospital, Bombay, for allowing me to study the case-records and report the findings. I am also thankful to all the honorary medical staff under whom these cases were admitted.

REFERENCES

EDWARDS, A. T. (1938). *British Encyclopædia of Medical Practice*, **8**, 177. Butterworth and Co., Ltd., London.
FISHER, A. M., and FINNEY, G. G. (1940). *Bull. Johns Hopkins Hosp.*, **66**, 263.
MAXWELL, J. (1934) .. *Quart. J. Med.*, **3**, 467.
ROBERTS, J. E. H. (1936). *Brompton Hospital Report*, London.
SHAH, M. J. (1939) .. *Indian Med. Gaz.*, **74**, 668.
TAYLOR, G. F., YUSUF, M., and CHITKARA, N. L. (1940). *Lancet*, *ii*, 320.

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tissue, considered his cases as examples of cystic lymphangiomata. The occurrence of hypertrophy has led many to consider some of the cases, at least, as tumour formations. Thus Stoerk (1897) designated a case as cystic bronchadenoma and Heuter (1914) regarded his case as congenital alveolar adenoma. Tooth (1897), Bernstein (1905), and Box (1907) considered the cysts in the lung as being formed by postnatal bronchiolar infection and occlusion. The theory of congenital malformation and bronchiolar distortion is put forward by Pollock and Marvin. Sauerbruch (1927) thought that it was due to prenatal constriction of a bronchus, especially of the left lower lobe, by pressure of the adjacent duct of Cuvier. But there is no proof that obstruction to the bronchus is produced in this way, particularly when the duct of Cuvier is found to disappear at an early stage. Besides, according to this theory, one would expect a lobar distribution of the condition rather than scattered lesions even at the periphery which are commonly found in cystic diseases. Heller (1885) put forward the theory of congenital pulmonary atelectasis as being the cause. According to Sandoz (1907) cysts results from syphilitic infection of the lung. This cannot, however, hold good, as in most of the cases there is no evidence of syphilis.

'Pinching of the pulmonary bud', which grows abnormally into a cystic space, is the explanation advanced by Schenck.

Reisner and Tehertkoff (1937) speak of arrested development with failure of pulmonary parenchyma to form, while bronchial ramifications continue to grow into abnormally large spaces.

Oudendal (1923) raised the point as to whether lung tissue could not be deviated by pleural overgrowth or abnormality. The rapid development of the pleuro-pericardial sac might disarrange the most centrally-placed lung substance, pushing the affected areas containing cartilage, glands, etc., even close to the periphery.

According to another theory, supported by Wood (1940), bronchial budding stops prematurely, and disorderly growth occurs consequently. Chandler *et al.* (1940) report a case of developmental cystic lung in an infant in which disorderly arrangement of the bronchi was found post mortem lends support to the theory of aplasia of the terminal lung elements. Sellors is inclined to view the question of cystic disease as one of atavism or reversion to a more primitive type of lung. Certain similarities between reptilian lungs and cystic lungs can be made out. He has found cystic changes occurring in an unduly high proportion of accessory or abnormal lobes, some of which suggest the tendency to evolutionary regression. Sellors' theory is fascinating though not convincing. If it is a question of evolutionary regression the cyst wall should in all cases be composed of lung tissue only. On the other hand, bronchial tissue is most often found in the walls of so-called lung cysts, as he himself admits when he says 'that the cysts and dilatations are essentially bronchial in character'.

Reviewing the available evidence one is inclined to view the question of cyst formation as a developmental disorder in which either the bronchial budding stops short at a certain stage, leaving the buds with blind ends, or the lung tissue, formed as a result of bronchial budding, fails to expand after birth. In both cases bronchial dilatations are sure to occur, in the first case even during fœtal life, and in the second, after birth when the lung expands during respiratory excursions. The mechanism of dilatation in the second case will be practically the same as in acquired bronchiectasis, as expounded by the writer (1941).

Pathology.—An excellent description of the pathology of cystic disease of the lung is given by Sellors. It will not be out of place to summarize his findings :—

Pleural reaction in uncomplicated cases is rare. The diseased area is generally contracted or shrunken owing to lack of aerated tissue. On section, usually the cysts appear as round spaces supported by dense tissue. When inflammation has occurred pus inside may be found and the walls have a thickened appearance.

The essential histological picture lies in the lining membrane uniformly maintaining the regular character of bronchial epithelium. But there is no disorderly disposition of cartilage, muscle and elastic tissue. There is extreme variability in their location and proportion.

Sellors gives a tabulated histological differentiation between congenital cysts and acquired dilations :—

	Congenital cysts	Acquired bronchiectasis
1.	Smooth lining, little contents unless infected.	Rough dirty lining, perhaps ulceration and pus formation.
2.	Regular columnar epithelium unaltered by mild degrees of infection.	Columnar epithelium shows inflammatory changes with ulceration, metaplasia and formation of granulation tissue.
3.	Predilection for parts of the lung not affected by acquired lesions, *i.e.*, subpleural areas, middle lobes, apices.	More centrally placed with a distribution that tends to be uniform over a lobe or lobes, particularly the lower.
4.	Relationship to the line and direction of air tubes not obvious.	Lie in the line of normal bronchial anatomy.

In many cases the distribution of cysts is such that they do not necessarily affect the whole lobe and, in consequence, it is possible to find normal alveolar tissue in close relation to the cysts. In some cases, on the other hand, there is complete absence of alveolar tissue. Even after most careful search, no connection has been established and it can be concluded that cysts and alveolar areas are separate units.

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Classification.—Lenk's (1933) classification into sac and honey-comb lungs is not adequate to include the different varieties met with. Sellors' classification is as follows :—

(1) Solitary cysts—
  (*a*) Huge balloon or distension cysts in infants, causing great pressure signs.
  (*b*) Small cysts of the size of an orange—often silent.

(2) Multiple cysts of variable size—
  (*a*) Medium size of groups of two or three near hilum—usually silent.
  (*b*) Small cysts the size of a cherry—
    (*i*) Lobar distribution.
    (*ii*) Diffuse or scattered.

King and Harris suggest the following classification based on mechanism of bronchial obstruction as applied to this disease :—

1. Congenital lung cysts. Stop-valve obstruction.
   - Solitary. Bronchial communication.
     1. Check-valve obstruction (balloon cyst).
     2. By-pass valve (non-expansile air cyst).
     3. Free large openings.
   - Multiple. No bronchial communication.
     1. Asymptomatic fluid cysts.
     2. Infection. Abscess, gangrene.

The histological classification of Maier and Haight (1940) into epithelialized and non-epithelialized cysts is not very helpful clinically. According to them epithelialization may be primary, as in congenital cysts, or secondary, as in acquired infected cavities into which epithelium grows into the bronchi.

Wood (1940) gives *x*-ray sorting of cysts into berry cysts, bubble cysts, balloon cysts, and fluid-filled cysts.

Symptomatology.—The clinical manifestation varies with the nature of the different lesions. One of the striking features is the frequency of making wrong diagnosis at the outset. Cases 3 and 8 in the series reported below illustrate this point as the diagnosis of cystic disease was not made at first.

Balloon cysts.—These usually manifest symptoms, either soon after birth or in the later period of infancy. The patient presents extreme cardiac and respiratory embarrassment owing to the sudden distension of the cyst and consequent mediastinal displacement. Signs of asphyxia with cyanosis are commonly noticed. If relief is not given by aspiration of air the child would die. Crosswell and King (1933) report the case of a child with balloon cyst in which relief from symptoms was obtained only by 'aspirating 8,000 c.cm. to 10,000 c.cm. of air from the cyst'. Subsequent infection of the cyst 'contributed to its obliteration, and consequent recovery of the child'. Case 3 in the present series is illustrative of the above condition though the symptoms were not so urgent as is commonly seen in this type.

Solitary cysts.—These are usually symptomless. Only accidental *x*-ray examination will reveal the condition unless they get infected, in which case they may even be mistaken for lung abscess. In support of their congenital origin other congenital abnormalities, such as heart disease, cystic kidneys, cystic liver, are found to be co-existent in some cases.

Multiple cysts.—These may be of medium size or small and berry-like. They are also discovered by accident only, unless they get infected early, as in case 7 of the series. Case 4, on the other hand, began to exhibit a few symptoms during adolescence. When infection occurs, symptoms will be like that of a case of acquired bronchiectasis. *X*-ray examination alone will reveal its congenital nature. In a few cases, recurrent hæmoptysis will be the only symptom, as in cases 9 and 10. As in the majority of cases, only a few cysts are seen in the region of the right lung, routine physical examination may not reveal any physical signs. The cysts, as a rule, have wide necks opening into the bronchii. Hence postural drainage is easy. Radiologically multiple ring shadows, often overlapping, are clearly seen. *X*-ray after lipiodol instillation will clinch the diagnosis.

Physical signs.—Signs depend upon the nature, number, size, contents, and situation of the cysts. Expansile balloon cysts will have all the signs of pneumothorax under tension, with tympanitic resonance, loss of breath sounds and mediastinal displacement. Small cysts generally do not produce any physical signs. When infected, however, multiple cysts may give rise to bubbling râles, on the affected side. Large fluid cysts, when situated near the periphery, may simulate pleural effusion with diminished movements, diminished vocal fremitus, dullness on percussion and diminished or absent breath sounds.

Complications.—Most of the complications arise out of infection. Chronic infection gives rise to the classical symptoms of bronchiectasis, namely paroxysmal postural cough, fœtid expectoration and clubbing of the fingers. Acute infection leads to the production of broncho-pneumonia, pneumonitis, abscess, pyo-pneumothorax, etc. Abscess of the brain might also occur as a complication, as in one of the cases in the present series.

Repeated hæmoptysis occurs as a complication, as in one of the cases reported. In some cases, rupture of the cyst may lead to spontaneous pneumothorax.

Diagnosis.—In many cases where there are neither symptoms nor physical signs the diagnosis must be made by radiogram. Contrast radiography will clinch the diagnosis in all cases.

A large balloon cyst may be extremely difficult to differentiate from a massive pneumothorax. Singer, discussing the paper on large infected pulmonary cysts by Maier and Haight, says that the cysts can be differentiated by the presence of strands of pulmonary tissue, which can be visualized by lipiodol. Wood (1934) tries to accomplish the differentiation by injecting air

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in the pleural cavity. In the case of a cyst, its outline will be pushed away from the parietal pleura.

Thin-walled tuberculous cavities may cause difficulty in diagnosis. But the presence of tubercle bacilli in the sputum and of tuberculous infiltration in the neighbourhood will help in the differentiation.

Pulmonary abscess cavities have thick walls and a certain amount of surrounding pneumonitis. Besides, the interior is not smooth. History of inflammatory trouble can be elicited in all cases.

Great difficulty will necessarily be encountered in distinguishing congenital cystic disease from acquired bronchiectasis. In such cases, generally, distinction can be made only by histological examination. In acquired bronchiectasis there will always be a previous history of a causative factor operating, mostly respiratory infection. The size, situation and appearance of the cavities are also of importance. In acquired bronchiectasis the dilatations will be found along the line of the bronchioles. They are chiefly oval or circular in shape. There will be irregularities in the size and shape of the remaining parts of the affected bronchioles. Such differences can be easily appreciated in a contrast radiogram. In congenital cystic disease, even an ordinary picture will show multiple ring shadows. Another point of distinction lies in finding cavities, even in the periphery of the lung.

Treatment.—Symptomless cysts, so long as they remain without producing any ill-health, can be left alone.

Attempts have been made to aspirate or drain large infected cysts, often with disappointing results. In cases of tension cysts, aspiration of air may bring about temporary relief, but no permanent cure can be effected. Enucleation of congenital cysts has nearly always been unsuccessful, according to Sellors.

The most effective treatment consists in removing the affected portion of the lung. Lobectomy or even pneumonectomy can be performed. Successful results have been reported by Gale *et al.* (1937), Arce (1937), and Roberts.

Conservative treatment consists in postural drainage, bronchoscopic lavage and expectorants. Radical treatment is not justified when there are only few symptoms or none at all. But when there is evidence of toxicity, surgical intervention is advisable.

People with symptomless cysts are well advised to guard themselves from respiratory infections.

Case reports

Case 1.—Female, aged 25 years, was admitted for cough off and on of three years' duration. Cough came on with slight fever each time lasting for ten or fifteen days. No history of similar trouble in the family. Had one or two similar attacks during childhood. Fairly well-nourished individual, slightly anæmic, teeth clean. Expectoration not more than two ounces a day. No tubercle bacilli in the sputum. No impairment of resonance over the lungs, but plenty of bubbling râles throughout the left lung. Ordinary *x*-ray showed ring shadows with some irregular opacities here and there throughout the left lung. Lipiodol bronchography revealed multiple cavities all over the left lung (plate IX, figures 1 and 2). *Diagnosis*—cystic congenital bronchiectasis.

Case 2.—Male, aged 3 years, was admitted on 12th March, 1941, with cough and irregular fever for six months: extremely emaciated; Mantoux test negative—no tubercle bacilli in the stomach wash. *X*-ray showed falling in of the ribs on the left side, irregular opacities and ring shadows throughout the left lung. *Diagnosis* of congenital cystic bronchiectasis was confirmed by lipiodol bronchography.

Case 3.—Female, aged six months (sister of case 2), was admitted on 13th August, 1941, for fever, cough and dyspnœa of six days' duration. Examination of the chest revealed displacement of the heart to the right, impaired resonance and diminished breath sounds. *X*-ray lying down showed uniform opacity, in the upper and mid zones on the left side. The opacity was limited below by a curved margin. *X*-ray in the erect posture showed a huge cavity with fluid level in the centre of the opacity. There were also vacuole-like spaces in the remaining part of the opaque area. Tomography showed the presence of multiple cavities with one balloon cyst. *X*-ray fifteen days after admission showed only the cyst, without any fluid inside. Temperature remained normal. Cough and dyspnœa disappeared. The child at the time of discharge was in perfect health but for the cystic lung.

Case 4.—Medical student, aged 23 years, came under observation in 1936 for cough with some expectoration of a month's duration. He had enjoyed perfect health before. Mantoux test was negative. No tubercle bacilli in the sputum. *X*-ray showed ring shadows in the left lung. Lipiodol bronchography revealed multiple cysts throughout the right lung (figure 3). His symptoms disappeared by simple symptomatic treatment. He is now a doctor in perfect health, none the worse for the malformation in the lung.

Case 5.—Male, aged 17 years, was admitted in 1936 with a history of cough from infancy coming on every winter. Mantoux test was negative. No tubercle bacilli in the sputum. *X*-ray showed multiple ring shadows in the right lung. Lipiodol bronchography confirmed the diagnosis of congenital cystic lung. He was readmitted in 1941 with very high fever and partial loss of consciousness. Signs of broncho-pneumonia were present. A diagnosis of cerebral abscess was made. He died 48 hours after admission.

Case 6.—Male, aged 35 years, admitted in July 1937 for cough with foul-smelling expectoration. He has had cough from infancy. There were no tubercle bacilli. Lipiodol *x*-ray showed cystic dilatations in the left lung (figure 4).

Case 7.—Male, aged 11 years, admitted in August 1941 for postural cough and foul-smelling expectoration; had cough from infancy. Mantoux negative. No tubercle bacilli in the sputum. *X*-ray showed irregular opacities with ring shadows. Lipiodol bronchography showed cystic dilatations throughout the left lung (figures 5 and 6). But for the morning cough and sputum he is in good health.

Case 8.—Male, aged one year and three months, was admitted in January 1935 for extreme emaciation, slight cough and infrequent fever. Physical examination revealed marked displacement of the trachea and apex beat to the left, impaired resonance, distant bronchial breathing and scattered râles on the left side. Mantoux negative, no tubercle bacilli in the stomach contents. Ordinary radiograph showed uniform opacity throughout the left side, but with vacuole-like spaces perceivable through the haziness. Lipiodol bronchography revealed the cystic nature of the lung (figures 7 and 8). (This case was reported by Viswanathan and Kesavaswamy in 1936.)

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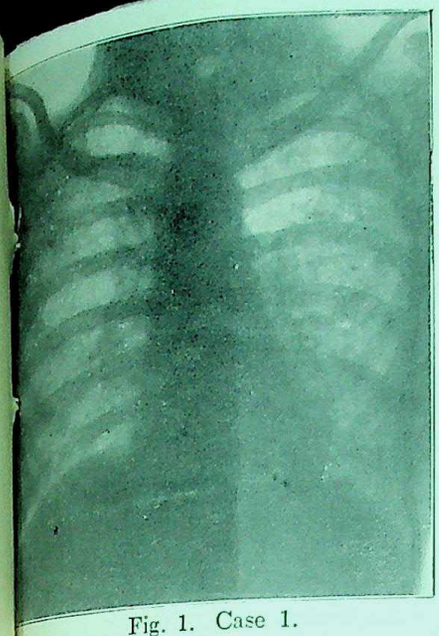

Fig. 1. Case 1.

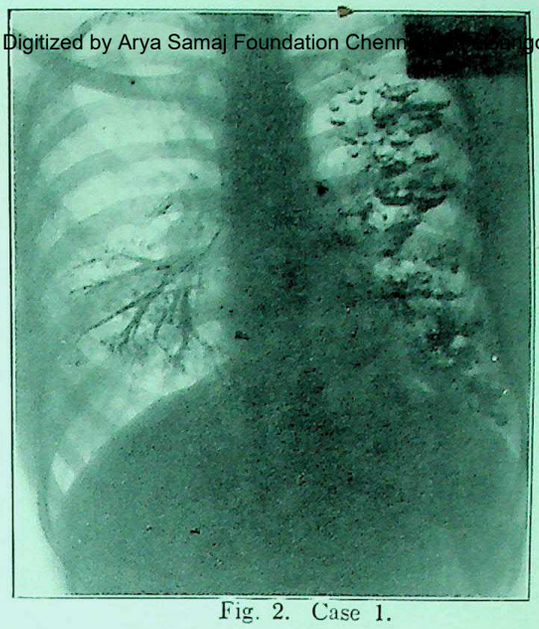

Fig. 2. Case 1.

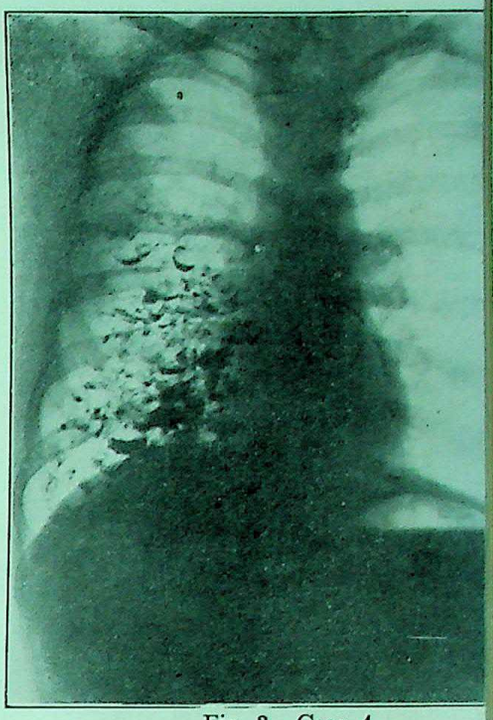

Fig. 3. Case 4.

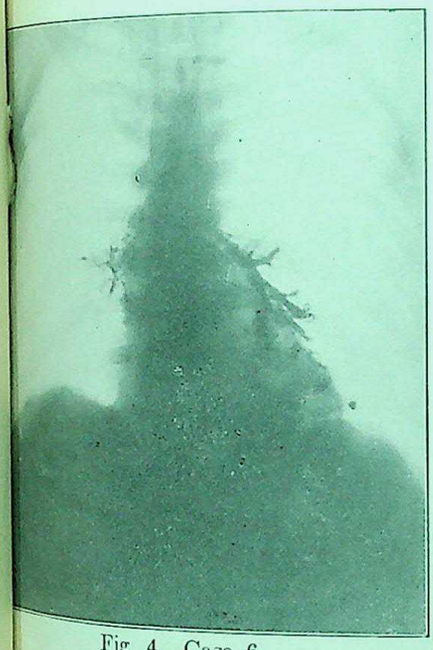

Fig. 4. Case 6.

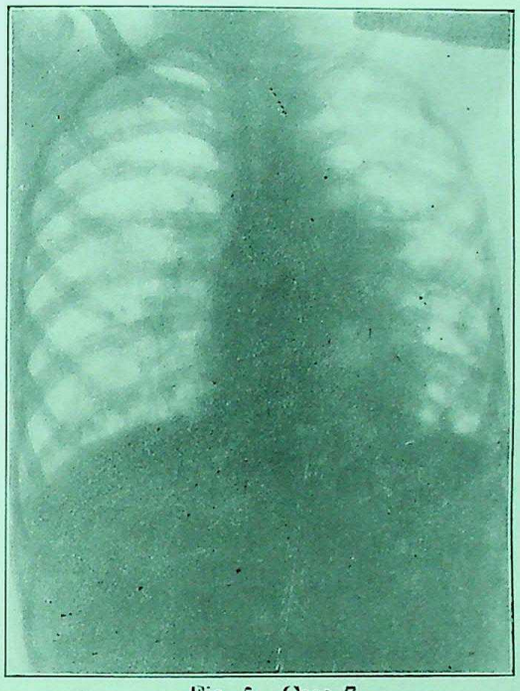

Fig. 5. Case 7.

Fig. 6. Case 7.

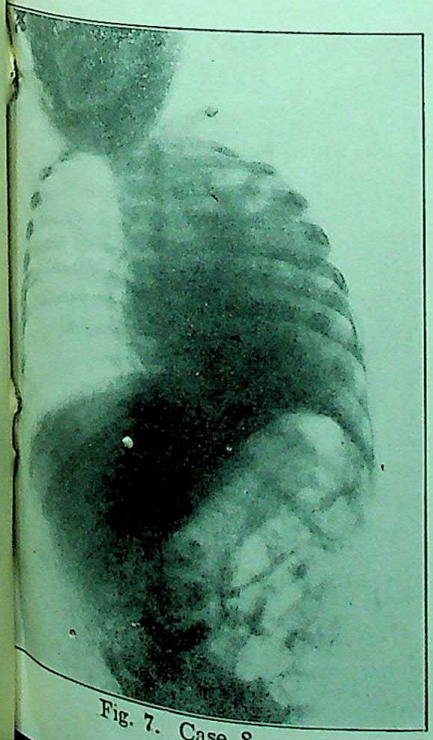

Fig. 7. Case 8.

Fig. 8. Case 8.

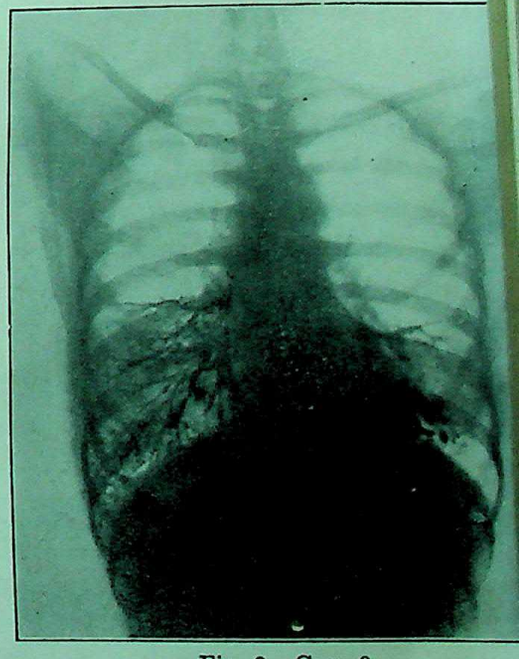

Fig. 9. Case 9.

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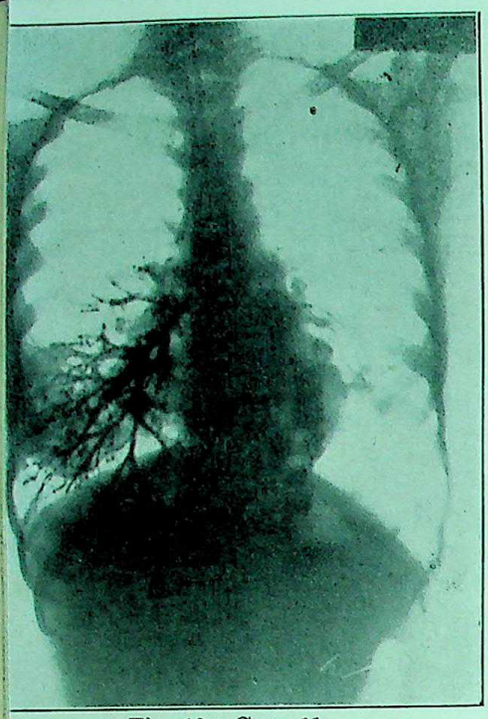

Fig. 10. Case 11.

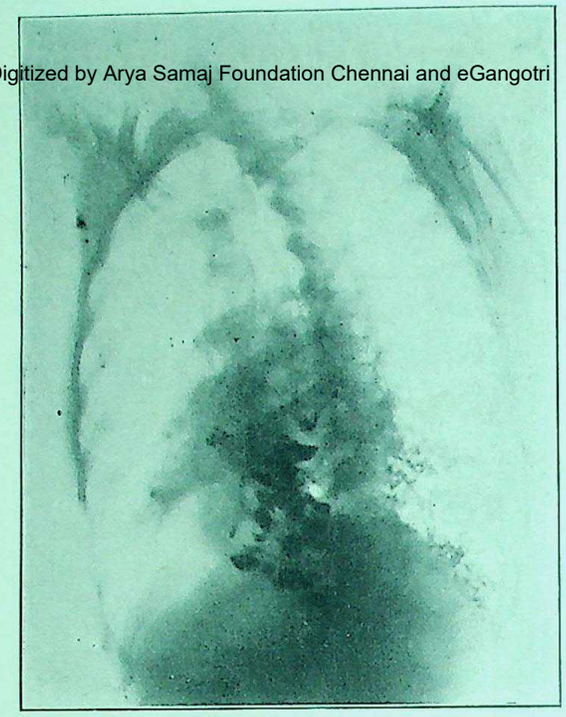

Fig. 11. Case 11.

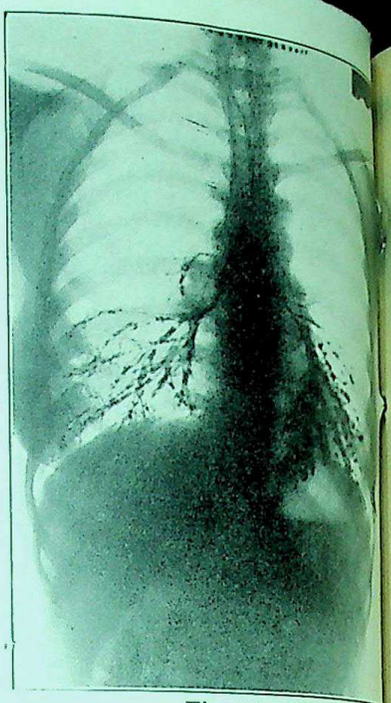

Fig. 12. Case 12.

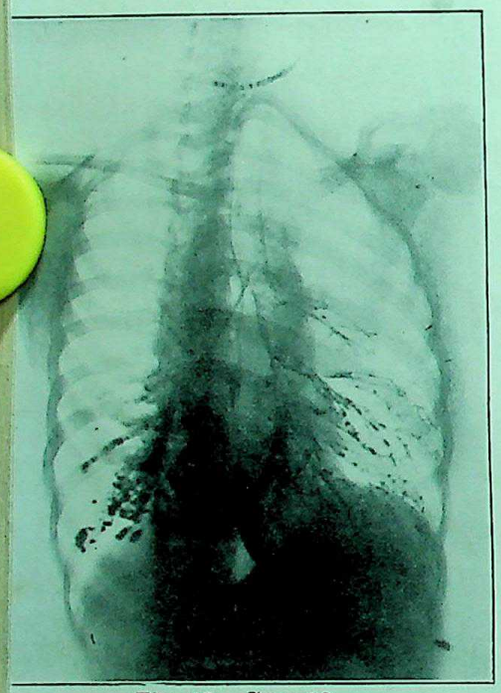

Fig. 13. Case 12.

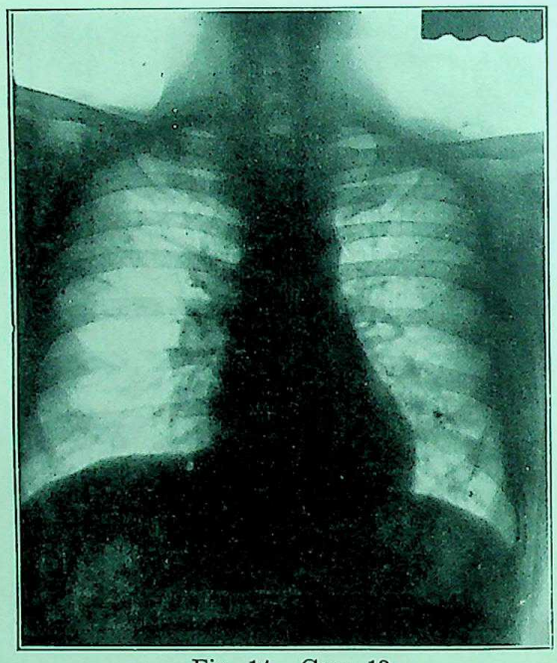

Fig. 14. Case 13.

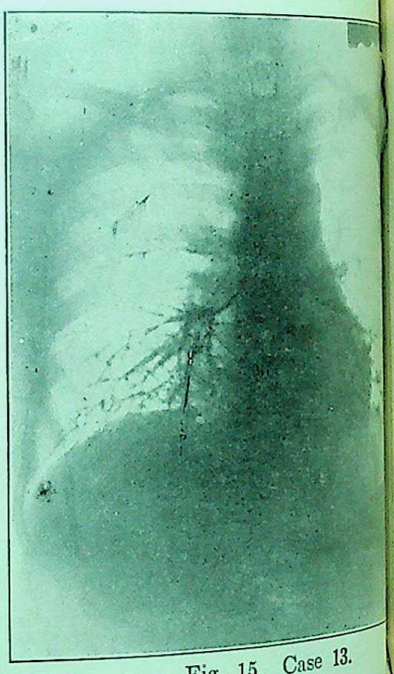

Fig. 15. Case 13.

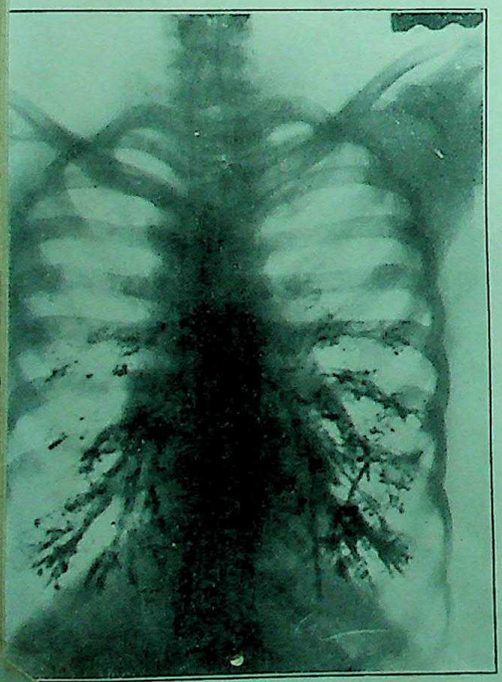

Fig. 16. Case 14.

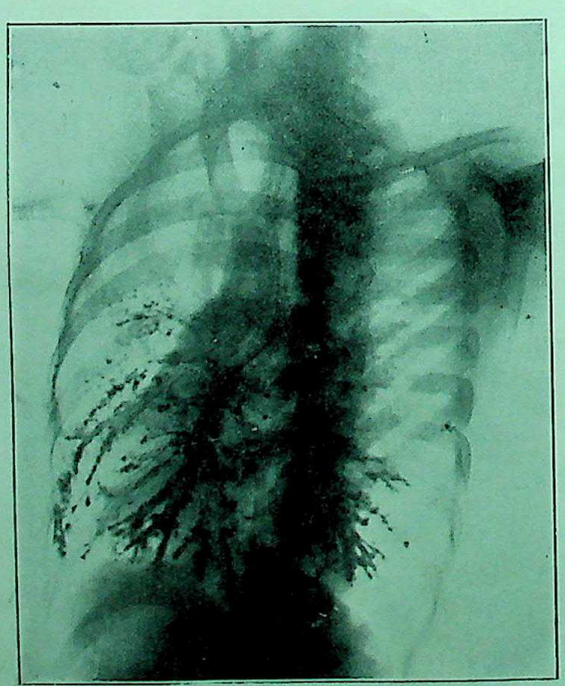

Fig. 17. Case 14.

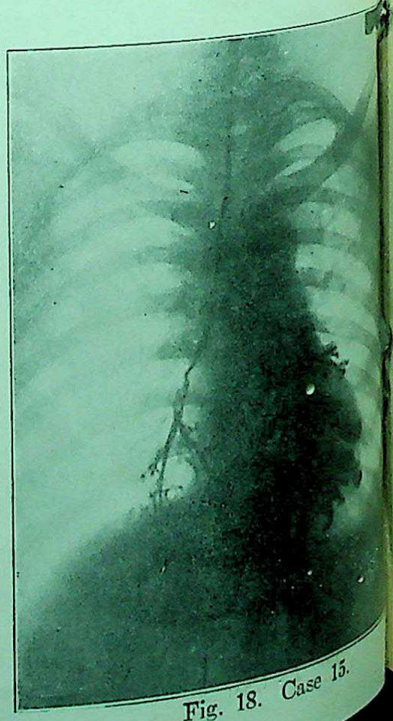

Fig. 18. Case 15.

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Case 9.—Female, aged 35 years, admitted in 1939 for an attack of severe hæmoptysis. Her first attack was in 1935. Subsequently two more attacks besides the one in 1939. At the time of admission she had bubbling râles over the left side, particularly at the base, evidently due to blood in the bronchioles; these disappeared when the hæmoptysis stopped. *X*-ray showed a few ring shadows in the lower zone of the left lung. Contrast radiography revealed cavities in the left lobe (figure 9).

Case 10.—Female, aged 35 years, had repeated attacks of hæmoptysis since her 20th year. On two occasions the hæmoptysis was so severe that the patient became almost pulseless. In between the attacks she was in perfect health. Contrast radiogram revealed two cysts of the size of a marble near the right hilar region.

Case 11.—Female, aged 25 years, came to the tuberculosis clinic on 18th December, 1940, for hæmoptysis and cough of 15 days' duration. She was in perfect health prior to the present attack. Clinically and radiologically she had no signs of tuberculosis. Lipiodol bronchography showed cystic condition of the left lower lobe (plate X, figures 10 and 11, the latter being oblique view).

Case 12.—Female, aged 22 years, admitted on 10th October, 1940, for cough from infancy with remissions and exacerbations. No history of acute respiratory trouble at any time. Sputum was negative for tubercle bacilli. *X*-ray of the lungs after lipiodol injection showed cystic bronchiectasis (figure 12 showing berry cysts and figure 13 oblique view).

Case 13.—Male, aged 40 years, came under observation on 10th March, 1941, for hæmoptysis. He spat blood one month back. He had a cough with slight expectoration. History of asthma in childhood. No fever. Pulse rate normal. No tubercle bacilli in the sputum. *X*-ray showed whorl-like appearance in the left lower zone and above the left hilum. Lipiodol bronchography showed multiple cavities in the left upper lobe (figures 14 and 15).

Case 14.—Male, aged 20 years, came to the tuberculosis clinic on 5th November, 1940, for attacks of dyspnœa coming on in paroxysms from childhood. Was having cough with expectoration for the last two years. No tubercle bacilli in the sputum. *X*-ray showed ring shadows in both lungs. Lipiodol radiogram confirmed the diagnosis of cystic lung (figures 16 and 17).

Case 15.—Male, was admitted for recurrent hæmoptysis in 1939. He started spitting blood in 1936. Prior to that he was in perfect health. He used to have cough for a few days after each attack of hæmoptysis. At the time of admission his cough was troublesome though mostly unproductive. Repeated examination of the sputum did not show tubercle bacilli. Lipiodol bronchography showed cystic condition of the left lower lobe (figure 18). Pneumothorax gave him relief from hæmoptysis. But the cystic dilatations were not collapsed. Though his general condition is good now, he is spitting large quantities of sputum showing that the cysts have now become infected.

Summary

1. An account of the ætiology, pathology, symptomatology, diagnosis and treatment with references to available literature on the subject of congenital cystic bronchiectasis, is given.

2. Fifteen cases of cystic bronchiectasis are reported.

REFERENCES

ANDRUS, P. M. (1940) .. *Amer. Rev. Tuberc.*, **41**, 104.
ARCE, J. (1937) .. *J. Thoracic Surg.*, **6**, 344.
BERNSTEIN, J. M. (1905). *Trans. Path. Soc. London*, **56**, 330.

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PELLAGRA IN BILASPUR STATE

By BRIJ LAL BATRA, L.S.M.F. (Pb.)

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BILASPUR STATE is situated in Simla Hills, 50 miles from Simla. Its area is 452 square miles and the population is 110,000 (1941 census). It is almost all hilly. The State has an average altitude of 3,000 feet though some of its peaks are over 6,500 feet high.

The State has fine forests in some of its area but most of the area is used for cultivation. Of the lands used for agricultural purposes, most of it is used for cereal crops, such as maize, wheat and rice. Out of pulses, *mash* is very widely grown.

The source of irrigation is chiefly rain-water. The staple diet of the people is maize and *dâl*.

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BOX, C. R. (1907) .. *Lancet, i*, 16.
CAFFEY, J. (1940) .. *Amer. J. Dis. Child*, **60**, 586.
CARR, J. W. (1891) .. *Practitioner*, **46**, 87.
CARRUTHERS, L. B. (1940). *Indian Med. Gaz.*, **75**, 336.
CHANDLER, F. G., *et al.* (1940). *Tubercle*, **21**, 292.
CROSSWELL, C. V., and KING, J. C. (1933). *J. Amer. Med. Assoc.*, **101**, 832.
GALE, J. W., KEELEY, J. L., and COON, H. M. (1937). *J. Thoracic Surg.*, **6**, 626.
GRAWITZ, P. (1880) .. *Virchows Arch.*, **82**, 217.
HELLER, A. (1885) .. *Deuch. Arch. Klin. Med.*, **36**, 189.
HEUTER, C. (1914) .. *Beitr. Path. Anat.*, **59**, 520.
KING, J. C., and HARRIS, L. C. (1937). *J. Amer. Med. Assoc.*, **108**, 274.
KOONTZ, A. R. (1925) .. *Bull. Johns Hopkins Hosp.*, **37**, 340.
LAENNEC, R. T. (1846). *Mediate Auscultation, and on Diseases of Heart and Lungs.*
LENK, R. (1933) .. *Fortschr. Röntgenol.*, **48**, 418.
MAIER, H. C., and HAIGHT, C. (1940). *J. Thoracic Surg.*, **9**, 471.
NORRIS, G. W., and LANDIS, H. R. M. (1933). *Diseases of the Chest and the Principles of Physical Diagnosis.* W. B. Saunders Co., Philadelphia.
OECHSLI, W. R., and MILES, S. H. (1934). *Tubercle*, **15**, 402.
OUDENDAL, A. J. F. (1923). *Virchows Arch.*, **244**, 59.
OUGHTERSON, A. W., and TAFFEL, M. (1936). *Yale J. Biol. and Med.*, **9**, 77.
REISNER, D., and TEHERTKOFF, I. G. (1937). *Quart. Bull. Sea View Hosp.*, **3**, 1.
SANDOZ, E. (1907) .. *Beitr. Path. Anat. Allg. Path.*, **41**, 495.
SAUERBRUCH, F. (1927). *Arch. Klin. Chir.*, **148**, 721.
SELLORS, T. H. (1938) .. *Tubercle*, **20**, 49.
SHARPE, C. T. (1940) .. *Radiology*, **34**, 692.
STOERK, O. (1897) .. *Weiner. Klin. Woch.*, **10**, 25.
TOOTH, H. H. (1897) .. *Trans. Path Soc., London*, **48**, 30.
VISWANATHAN, R. (1941). *Indian Med. Gaz.*, **76**, 140.
VISWANATHAN, R., and KESAVASWAMY, P. (1936). *Radiology*, **27**, 371.
WOOD, H. G. (1934) .. *J. Amer. Med. Assoc.*, **103**, 815.
WOOD, W. B. (1940) .. *Proc. Roy. Soc. Med.*, **33**, 335.

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They take wheat and rice as well with occasional use of fish, meat and vegetables.

It cannot be ascertained when this disease first occurred in this State. I have come across many cases of this as well as of other vitamin-deficiency diseases, such as scurvy, rickets, and xerophthalmia, but pellagra is most frequently seen.

The disease is intense in winter months, both sexes suffer but I have come across more male cases. The cases treated have been between the ages of 12 and 38.

I have ascertained that the cause of the disease here is only lack of well-balanced diet because almost all the cases improved with the administration of good food and vitamins in the form of drugs.

An account of 20 cases is given, and I have divided them into two groups :—

1. Typical pellagra cases.
2. Atypical pellagra cases.

They were all cases of pellagra, but distinction was only of severity of disease. Patients with marked skin lesions, gastro-intestinal and nervous symptoms were classified as typical pellagra cases and less definite cases were put in the other group.

Typical pellagra cases

Only four cases were allotted to this group, three of which were treated in the hospital and one as an out-door patient.

Case 1.—Hindu female, wife of a carpenter, aged 40 years, duration of complaints 4 years. Patient was pale, and had wide staring look, giddiness, pain in the back, sensation of heat all over the body, nausea, occasional vomiting, sore tongue, diarrhœa, 5 to 6 stools daily, appetite was lessened, weight on admission was 82 pounds.

Skin.—This at the back of hands, back of feet, forearms, legs, chest, neck, cheeks was thickened. There were irregular patches on these parts. There was a butterfly patch on the bridge of the nose.

Nerves.—Reflexes exaggerated, sleeplessness, irritability and pevishness in paroxysms, otherwise melancholic and silent.

Her staple diet was maize and *dâl.*

Treatment.—Maize was cut from her diet and she was put on wheat flour, eggs, vegetables, chicken soup, milk and ghee.

Drugs.—1. Nicotinic acid tablets (Glaxo), 1 tablet, three times a day.
2. 'Vitys' tablets (Bengal Chemical), 1 tablet four times a day.
3. Marmite, 2 teaspoonfuls, three times a day.

After 20 days of treatment, she began to show improvement. Her temper was improved, appetite increased. For skin she was given salicylic ointment. The skin began to peel off and pale skin appeared. There was no nausea or vomiting, and diarrhœa stopped.

She remained in the hospital for 1½ months when she was discharged as cured. Her weight at the time of discharge was 89 pounds. It is 6 months since she was discharged from the hospital and she is still under observation. She is taking diet as she was told. Her weight has further increased.

Case 2.—Hindu boy, aged 12 years, son of a peasant. The father of the patient stated that his elder son had died of the same disease after turning insane.

Staple diet of the boy was maize and *dâl.* The duration of disease was 2 years. The boy was very morose and dull, and took no interest in his work. He was pale and complained of a burning sensation in the palms and soles. He had a sore tongue and diarrhœa, 5 to 6 stools a day. He had no appetite.

Skin.—This was dark and thickened on the back of the hands and feet, more marked on the front of the legs.

There were mild tremors of the tongue, reflexes were exaggerated and he had insomnia.

Treatment.—Same as in case 1.

The signs of improvement appeared after a fortnight. The number of stools lessened and appetite improved. After 1½ months of treatment, he was cheerful and began to mix with other boys. In 20 days, his weight increased by 1½ pounds.

After 1¾ months, he was discharged as cured but he is still under observation.

Case 3.—Hindu female, aged 36 years, wife of a Simla riksha coolie. Duration of disease was 8 years. She was extremely anæmic and weak and was unable to walk. She had developed nutritional cataract, and had no menstruation for the last 6 years. She had very severe headache and giddiness.

Tongue was extremely pale and she had no appetite. Diarrhœa, 8 to 10 stools daily, for the last one year.

Skin.—There were symmetrical dry thickened desquamated patches, on the back of the hands, feet, legs, cheeks, and around the nose. The genitals were also affected.

Heart.—There was hæmic murmur in the pulmonary area of the heart, pulse was feeble and 120 per minute.

The nails were brittle and spoon-shaped.

Nerves.—Mild tremors of the tongue, deep reflexes were exaggerated, ankle clonus was present. There were cramps in the body and sleeplessness. The symptoms had aggravated last winter.

Treatment.—She was put on the same drug and dietetic treatment as cases 1 and 2 with iron and ammonium citrate (with liquor arsenicalis). In her case, nicotinic acid tablets were given, 6 times a day. She did not show any sign of improvement for about 20 days. She vomited out iron mixture every time it was given, and then it was stopped. Signs of improvement appeared after 2½ weeks. The number of stools decreased and vomiting stopped. Iron mixture was resumed which she accepted. The drug and dietetic treatment was continued for 3 months. In this period, she gained strength and she was able to walk 60 to 80 steps herself. Appetite also improved. Thickened skin also began to peel off. She remained in the hospital for 4¼ months and in this period she had gained 16 pounds in weight. She could walk freely and most of her symptoms were completely relieved.

Case 4.—Hindu boy, aged 18 years, son of a peasant, duration of disease 1½ years. Staple diet maize and *dâl.* He was melancholic and restless. He could never lie down on the bed for more than ½ hour. He had giddiness, pain in the back and limbs, tongue was sore, and there was copious salivation. There was saltish taste in the mouth. He had vomiting and diarrhœa, 4 to 5 stools a day.

Skin.—This was thickened on the back of the arms and legs and there was a typical butterfly patch on the bridge of the nose. He had burning sensation all over the body, specially soles. Deep reflexes were exaggerated. There was a tendency to fall forward when standing. He had a constant idea in his mind that he was being pursued by witches and evil spirits.

Treatment.—Same treatment as above was given. He stayed in the hospital for only 6 days. He was brought again after 2 days by his father but he refused to stay. It was 2½ months ago. I have come to know that he is now more melancholic and does not speak to anybody.

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A BRIEF REVIEW OF ONE HUNDRED AND THIRTY-THREE CONSECUTIVE CASES OF QUINSY TREATED BY IMMEDIATE TONSILLECTOMY

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PERITONSILLAR ABSCESS or quinsy is a fairly common variety of 'acute sore-throat' which disables the patient for nearly ten days at a time and may be followed by severe complications and sequelæ. Usually starting with an acute follicular tonsillitis on one side of the throat, the quinsy is fully developed by the fifth day, when there will be severe pain on the affected side of the throat, with painful swelling of the neck, tender cervical glands, offensive breath, coated tongue and teeth, severe dysphagia, excessive salivation dribbling from the mouth and inability to talk clearly. The patient appears toxic with a high temperature, rapid pulse, an anxious expression of the face, the neck slightly bent to the affected side, while locally, the affected tonsil appears very prominent and congested, with some exudation at the mouths of the crypts; the pillars of the fauces appear congested and œdematous and the œdematous uvula will be pushed to the opposite side. The tenacious mucus collecting about the congested and œdematous oro-pharynx and laryngo-pharynx can neither be swallowed nor expelled and the slightly impeded and gurgling respiration completes the pathetic picture of agony in a severe case.

It is but fair to the patient that the treatment recommended in such a serious malady must be quite safe, certain in its results, free from complications and ensure against relapses with their possible complications and sequelæ. The best procedure in such a case is surgical interference in addition to such helpful measures as prompt evacuation of the bowels, rest in bed, fluids in plenty, fomentations locally and good nursing. Sulphanilamide therapy is a useful adjunct. The usual surgical treatment recommended in such a case is to drain the quinsy through the soft palate at a site slightly medial to the mid-point between the base of the uvula and the last upper molar tooth on the affected side. In addition, removal of the 'septic tonsils' during the quiescent interval is recommended.

In a previous paper (Rao, 1939) I have discussed the drawbacks of this procedure. Briefly, they are:—

1. Only a long-standing abscess in the upper third of the tonsil fossa will be drained by this incision.
2. An abscess in the middle third or lower third of the tonsil fossa cannot be drained by this incision.
3. This incision drains the abscess at its upper instead of at the dependent pole.
4. It tends to close too soon and frequently needs re-opening.
5. When once the patient is relieved of his acute distress, it is exceptional to find him returning to the doctor for tonsillectomy during the quiescent interval.
6. Thus, the septic focus is left behind and the patients run the risk of similar frequent relapses with their dangerous complications and disabling sequelæ such as arthritis, cardiac complications, neuritis, fibrositis, cervical adenitis, laryngitis, bronchitis and other disabling lesions.

The treatment of this serious and acute condition by immediate tonsillectomy overcomes all the drawbacks pointed out above. By removing the whole tonsil, excellent drainage is provided for the entire peritonsillar space into the oro-pharynx, and so the abscesses situated in the middle third and the lower third of the tonsil fossa are effectively drained by this procedure. It is needless to add that the necessity for re-drainage does not arise. If the other tonsil, probably septic, is also removed at this occasion, there is no chance of the patient suffering a similar attack on the opposite side. The patient

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Atypical cases

Sixteen more cases were seen and all of them were put in the 'atypical' group. One of them, a male, aged 22, was a cousin of case 2, described above. He was insane for the last 2 years. He was melancholic and did not speak at all. He had a good appetite and no diarrhœa. Skin lesions were very definite on the arm, face, legs, thighs and genitals. He had no treatment at all.

The rest of the cases were aged from 14 to 38. Twelve were males and 3 females. All were Hindus of the poorer classes.

Almost all of them complained of burning sensation of the soles and palms, and 6 of them complained of sore tongue. Three of them improved with the administration of nicotinic acid tablets and well-balanced diet. Some of them are still under treatment.

Seven had skin lesions only, 5 of them improved with a well-balanced diet and marmite administration.

Two had skin lesions as well as severe diarrhœa and they too improved with the above treatment.

In 7, knee jerks were exaggerated. Two of them had also polyneuritis.

Summary

Twenty cases of pellagra are reported.
Details of four cases are given.
All lived on a staple diet of maize and *dâl*.
Those that were treated improved on the administration of a well-balanced diet *plus* nicotinic acid and marmite.

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in his distress is most often quite willing to undergo any operation which gives him immediate and definite relief. Bilateral tonsillectomy on such a patient has the great advantage of not only affording immediate relief but a permanent cure with the certainty of eliminating relapses with their possible complications and sequelæ. The method is quite safe and free from complications, as can be judged by the uniformly satisfactory results obtained in a consecutive, unselected series of one hundred and thirty-three cases of quinsy treated in this clinic by immediate bilateral tonsillectomy during the last three and a half years.

The usual complications that are feared in this procedure are (1) hæmorrhage, (2) septicæmia, (3) pain, and (4) the possibility of performing the operation on a patient in such distress. The observations made in my previous paper regarding the above complications are confirmed by the experiences in the present series of cases.

1. Hæmorrhage, either primary or secondary, occurring from the abscess side is very infrequent. In eight cases of this series, the amount of blood lost varied from half to two ounces and the bleeding occurred on the fourth or fifth day after the operation. In four cases, the blood oozed from the side of the quinsy and in the other four from the healthy side. I have formed the impression that hæmorrhage, either primary or secondary, in these quinsy cases is certainly not more frequent nor more abundant than in the usual operations for 'septic tonsils'.

2. Septicæmia in this series was conspicuous by its absence, in spite of the fact that both tonsils were removed under local anæsthesia after infiltration of 1 per cent planocaine solution (with 10 minims of one in a thousand adrenalin per ounce of planocaine solution) into the pillars of the fauces and the peritonsillar tissues. This is probably explained by the tonsillar fossæ freely draining into the oro-pharynx after the tonsils are removed. In many cases, foul pus escaped under pressure during tonsillectomy on the side of the quinsy, and later, the unaffected tonsil was removed. Even these cases did not develop any septicæmia. The same explanation of drainage of the peritonsillar tissues into the oro-pharynx overcomes the theoretical objection to infiltrating planocaine into the pillars of the fauces on the side in which the abscess was situated.

3. Pain on the side of the abscess is almost negligible immediately after the operation, but is present in variable degree on the healthy side. Slight pain in the ears is frequently complained of, being either reflex in nature or due to tubal catarrh.

4. Most of these 'quinsy' patients on admission can open the mouth widely enough and can be readily operated upon under local anesthesia —usually in the sitting posture. If the general condition is not satisfactory and the patient unable to open the mouth widely enough, the quinsy may first be incised and drained or aspirated and tonsillectomy postponed for a couple of days. The operation on the side of the quinsy is comparatively easy, since the abscess will have separated the tonsil from part of its bed. In every case in this series, the end-result has been quite satisfactory and there has not been a single fatality.

Some points of interest in this series may be mentioned. Six patients had bilateral quinsy and responded very well to immediate tonsillectomy. The diagnosis of quinsy has been confirmed in over ninety per cent of these cases by aspirating frank pus through the anterior pillar with a wide bore needle and syringe. As mentioned before, only eight cases had secondary hæmorrhage, four from the side upon which the abscess was situated and the other four from the healthy side. None of the cases developed septicæmia. These patients stayed in the hospital, on an average, for only five and a half days after the operation. Many felt fit enough to be discharged on the third day after operation but were detained for two more days to be under observation for any possible secondary hæmorrhage. In this series of one hundred and thirty-three cases, one hundred and two were Hindus, twenty-nine Mohammedans and two were Christians. Seventy-two were men and sixty-one women. The following age-groups are of interest :—

Age group	Number of patients
1 to 10	1
11 to 20	47
21 to 30	61
31 to 40	15
41 to 50	5
51 to 60	4

The number of patients below fifteen years of age was twelve; the number between fifteen and thirty was ninety-seven. The youngest was six years of age and the oldest patient was sixty. Three case histories of particular interest are noted below :—

Case 1.—Hindu boy, aged 6 years. Admitted on 9th March, 1941, with a complaint of pain in the throat and dysphagia for three days. Temperature on admission 99.5°F., pulse rate 102 per minute. No previous history of illness. Well-built boy. Local examination revealed quinsy on the left side, confirmed by aspirating frank pus. Patient had slight rhinitis and adenoiditis. He was treated for the cold with 10 per cent argyrol for nasal drops twice daily, sulphanilamide—half a tablet three times a day and the following mixture:—

℞ Sodii salicylatis	gr. xx,
Sodii bicarbonatis	ʒi
Spiritus ammonii aromatici	ʒi
Aquam chloroformi	ad ʒii

F.M. 1/3 t.d.s.

13*th March.*—Bilateral tonsillectomy and adenoid curettage were performed under chloroform. During the operation, the amount of blood lost did not exceed

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two ounces. The left tonsil was found slightly infiltrated and separated very easily from its bed. The patient made an uneventful recovery and was discharged cured on 17th March.

Case 2.—Mrs. G., aged 18 years, housewife, admitted on 4th July, 1940, complaining of severe pain in the throat and dysphagia for eight days. She had suffered from left-sided quinsy a year back and was relieved by a palatal incision and drainage. On examination on 4th July the patient had left-sided quinsy confirmed by aspiration. Temperature 98.4°F., pulse 90 per minute, tongue toxic and coated, teeth dirty and breath very offensive. Local anæsthesia failed in this case and the patient would not even open the mouth satisfactorily. So she was put under chloroform and bilateral tonsillectomy performed within a couple of hours after admission. At 5 p.m. the general condition of the patient was satisfactory. Temperature 100°F. and pulse 110 per minute with fair volume.

5th July.—Patient swallows sips of glucose water and other fluids. The subsequent recovery was uneventful. Patient was discharged cured on 10th July.

Case 3.—Mrs. Z., Mohammedan, aged 30 years. Admitted on 4th May, 1939, complaining of severe sore-throat and dysphagia of four days' duration. Admits previous history of two or three severe attacks of sore-throat per year for the past fifteen years and definitely says that she was given temporary relief on at least six occasions by palatal incision and drainage during the recurrent attacks of quinsy. On examination, the patient appeared toxic, temperature 100.5°F., pulse 120 per minute, fair volume. Tongue appeared dry and coated, tender cervical glands on the right side.

Diagnosis.—Right-sided quinsy confirmed by aspiration. Left tonsil congested and slightly prominent. But the left tonsillar fossa was not aspirated. Prontosil 5 c.cm. injected intramuscularly.

4th May, 5 p.m.—Temperature 102.5°F., pulse 120 per minute, patient still toxic.

6th May, 9 a.m.—Temperature 98.5°F., pulse 106 per minute. Bilateral tonsillectomy performed under local anæsthesia. Pus escaped into the pharynx from both tonsillar fossæ during operation.

5 p.m.—Temperature 100°F., pulse rate 132 per minute, fair volume.

7th May, 9 a.m.—Temperature 98.4°F., pulse rate 104 per minute. Swallows sips of fluids with fair ease. The further progress of the patient was quite uneventful and she was discharged cured on 11th May.

Conclusion.—In view of the very satisfactory results obtained in the present series of one hundred and thirty-three consecutive unselected cases of quinsy treated by me, I feel justified in recommending immediate tonsillectomy as the treatment of choice in quinsy. As pointed out previously, it is quite safe, free from complications, affords immediate relief and permanent cure, and completely eliminates relapses and the unpleasant sequelæ attendant on 'septic tonsils'. I am not forcing this line of treatment on the unfortunate patient in agony who may be willing to subject himself to any line of treatment offered, but advise and practise this method, being convinced of its very satisfactory results.

It is a pleasure to express my thankfulness to Dr. J. F. Robinson, Durbar Surgeon and Medical Officer, Krishnarajendra Hospital, Mysore, for the kind encouragement and interest which he has extended to me in my work.

REFERENCE

RAO, K. K. (1939) .. *Indian Med. Gaz.*, **74**, 334.

A CASE OF AIR EMBOLISM AS A RESULT OF PUNCTURING THE LUNG

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AIR embolism is a very rare but a very serious complication of artificial pneumothorax treatment. It occurs most frequently during the induction of pneumothorax, but on certain rare occasions has been met with during a re-fill. Cases have also been recorded in which the entry of a needle into the lung without the introduction of any air caused symptoms resembling those of air embolism, but most of these cases have been ascribed to pleural shock.

There are four possible methods (Alexander, 1937) by which air may enter the blood stream and cause embolism during the induction of pneumothorax treatment :—

(1) Air may be injected into a pulmonary vein owing to faulty technique. Unknown quantities of room air may enter the circulation directly when an open induction needle is used, without being connected to the manometer.

(2) Air may be sucked into a pulmonary vein from the tubes and the manometer, there being negative pressure in these venous channels.

(3) The production of an air pocket under pressure may tear a recent adhesion and open up a venous channel in it, which may absorb the injected air. In such a case embolism may occur some time after the induction.

(4) If the needle should penetrate an adherent lung, the movement of the lung with respiration across the needle point might cause the needle to open a venous channel to the air of an alveolus or a bronchiole, from which, if it keeps open long enough, it may absorb large quantities of air.

Chand and Wig (1940) published a case in which air embolism occurred as a result of the pneumothorax needle entering the lung tissue though no air had been injected. The occurrence of hæmoptysis at the same time proved that the needle had entered the lung. They thus came to the conclusion that at any rate in that particular case air embolism occurred as a result of puncture of the lung and absorption of air into a pulmonary vein from the ruptured alveoli.

Another case, the details of which are given below, has come to our notice in which air embolism followed the entry of a needle into the lung tissue even though no pneumothorax was attempted :—

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G. M. R., male, about 40 years of age, was suffering from pulmonary tuberculosis for the last three years. Sputum was positive. The lesion was of a chronic fibro-caseous type. It was more extensive in the right upper lobe and a few cavities were present there. The left lung showed a few scattered patches of fibrosis. Artificial pneumothorax was tried on the right side but failed, due to the presence of diffuse adhesions. A thoracoplasty was considered undesirable, on account of the presence of a few active signs on the left. It was decided to collapse the cavities in the right upper lobe by an extra-pleural pneumothorax. A successful operation for this was done on him on the 29th May, 1941, by one of us (B. S. N.). The patient stood the operation very well and a fill of about 200 c.cm. of air was given immediately after the operation. Another fill of 150 c.cm. was given 36 hours later. A skiagram taken immediately after the operation showed the extra-pleural cavity created by the operation to be full of air, but a skiagram taken 24 hours after the second fill showed that the cavity had become filled with an opaque mass probably consisting of serum and blood. An attempt was made to aspirate the serum through the intercostal space immediately below the clavicle. A few cubic centimetres of serum were removed but no air could be injected and no more serum or blood could be removed through that space. Next morning it was decided to introduce the needle for aspiration of the serum and blood at a lower level. With the patient lifted on a back rest a needle was pushed in the 4th intercostal space in the axillary line as it was thought that this was the lowest level of the extra-pleural cavity. While the needle was being pushed the patient coughed and looked as if he wanted to expectorate out some sputum but immediately fell back unconscious. The face became deathly pale. The respiration stopped and the pulse became imperceptible. For a moment it looked as if the patient was dead. The back rest was immediately removed—the foot of the bed was lifted and artificial respiration was started. The breathing returned and the pulse became easily perceptible. The heart began to beat strongly. It did so for a few moments and then the pulse became feeble again. The respiration continued normally but the patient became cyanosed. It looked as if the sputum, which he had not been able to expectorate owing to the onset of sudden unconsciousness, was causing obstruction in his respiration. An electric sucker was used to suck out the sputum from his pharynx and a catheter was introduced into the trachea. The patient was moreover put in the prone position and the foot of the bed was kept high. This treatment was continued and in addition injections of 0.5 c.cm. of adrenalin, 1/100th grain of atropine sulphate and 3 c.cm. of coramine were given. The latter injection was given intravenously. The patient gradually revived. Cyanosis began to diminish after about three-quarters of an hour but the pulse became normal only after 5 or 6 hours. When he became fully conscious he complained that the right arm and the right leg were extremely weak.

No detailed examination of his nervous system had been possible while he was unconscious. An examination at this stage, however, showed that the power in the right arm and right leg was extremely feeble. He could use them a little and the paralysis was not complete but there was no doubt about the marked loss of power in the muscles of these extremities. The deep reflexes were exaggerated when compared to the opposite side while the superficial abdominal reflexes were comparatively diminished. The plantar response was, however, flexor on both the sides at this stage. There were no sensory changes, either subjective or objective, and there was no affection of the cranial nerve area.

The paralysis began to diminish steadily after the day of its occurrence but full power in the limbs returned about one month after the operation.

There can be no doubt that the case was one of air embolism involving the cortical area. The original embolism was, however, so short-lived that it did not leave any permanent area of necrosis. In this case there can only be one cause for air embolism. The other three causes out of the four mentioned in the beginning of the article are out of the question. As the needle was introduced at the lowest limit of the extra-pleural cavity, it seems that it traversed a portion of the lung tissue before it could enter the extra-pleural pneumothorax space. While passing through the lung tissue it ruptured some alveoli and opened a venous channel. The latter absorbed air from the torn alveoli and caused symptoms of air embolism.

Like the case reported by Amir Chand and Wig, this case conclusively proves that at least one important cause of air embolism is absorption of air by a pulmonary vein from the torn lung tissue. To us this seems to be the most important cause of air embolism in artificial pneumothorax treatment. Only two cases of air embolism have occurred so far in the wards of the Rai Bahadur Amar Nath Tuberculosis Institute during the last five years, though during this period some thousands of artificial pneumothorax fills including some hundreds of primary fills have been given. In both these cases the cause was the same—a tear in the lung. Moreover the other causes mentioned as possibilities ought to be rare if proper precautions during artificial pneumothorax fills are taken and one can presume that all experienced workers take these precautions. In spite of the latter fact, however, air embolism has remained an important though a rare complication of pneumothorax treatment.

We may further hazard the view that cases of so-called pleural shock recorded when introducing a needle into the chest for aspiration of pleural effusions, etc., are really cases of air embolism similar in nature to the one described by us in the article. Air embolism due to its very nature can show a multiplicity of symptoms. When the block is in a cerebral or a retinal vessel, the diagnosis is easy and obvious, for localizing symptoms like convulsions, paralysis, and blindness are produced. When the situation of the block is such that such localizing symptoms cannot be produced, and the foundation for a definite diagnosis is thus lacking, pleural shock is often assumed. Durant (1935) described a case of coronary air embolism in which he obtained electrocardiographic evidence of coronary embolism three hours after the accident. The symptoms in this case were bizarre and both hysteria and pleural shock had been diagnosed before the diagnosis was clinched by the electrocardiogram.

REFERENCES

ALEXANDER, J. (1937) .. *Collapse Therapy of Pulmonary Tuberculosis.* Charles C. Thomas, Springfield.

CHAND, A., and WIG, K. L. (1940). *Indian Med. Gaz.*, **75**, 744.

DURANT, T. M. (1935). *Ann. Intern. Med.*, **8**, 1625.

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A SIMPLE METHOD OF COUNTING HOOKWORM EGGS IN FÆCES

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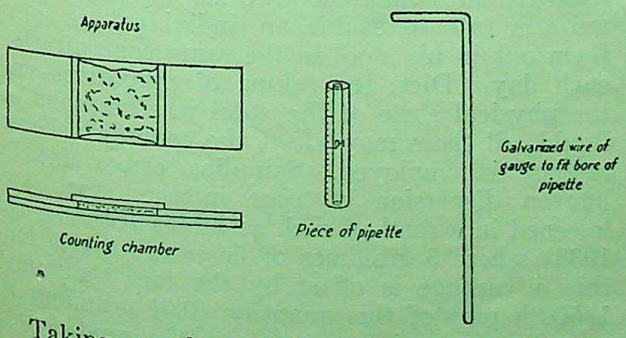
WORKING in a small up-country hospital of 40 beds in a district where light and medium grades of hookworm infestation form a common background to other diseases and hookworm anæmia is not infrequent, the author felt the need of a simple routine method of examining stools for hookworm eggs, which would at the same time give some quantitative indication of the severity of the infestation or of the results of treatment. No special apparatus was available and routine stool examinations had to take their turn with other laboratory procedures. There has been no opportunity for comparing results obtained by the method here described, with standard methods in use in larger laboratories with which it is not desired to compete. This method has been found quick and sufficiently accurate to be clinically useful. It has been in routine use in this hospital for over two years.

A modified glycerine-salt floatation technique is used with apparatus prepared in the laboratory as follows. A thick glass microscope slide 75 mm. × 25 mm. × about 1.7 mm. is cut, by means of an ampoule-file or glass cutter, into three equal pieces. The middle piece is discarded and the two end pieces cemented on to the ends of another slide, so as to leave a space between them 25 mm. square. A suitable waterproof cement is Rawlplug 'Durofix' and the opposing surfaces should first be roughened. Another piece of glass slide about 30 mm. long is laid across the gap and the space thus enclosed has a volume slightly more than 1 c.cm. A straight glass tube pipette of 1 c.cm. capacity graduated in hundredths is carefully cut with an ampoule-file into five short lengths, each containing 0.2 c.cm. Some pieces of stout galvanized-iron wire, of a gauge to fit the bore of the pipette easily, are cut, about 4 inches long. One end should be turned down as a handle and the other filed off squarely (*see* diagram).



Taking a clean dry piece of pipette the specimen of stool is 'stabbed' in a number of places until the column of fæces rises inside to the half-way or 0.1 c.cm. mark. The pipette is pressed squarely down and twisted to ensure that on withdrawal the column of fæces does not recede. Excess is struck off by a piece of stick passed across the end of the tube the outside of which is also quickly cleaned. Using a piece of galvanized wire as a plunger the column of fæces is expelled on to the middle of the prepared slide. Fluid stools may be drawn up to the mark and expelled by fixing a rubber teat on to the piece of pipette. A saturated solution of sodium chloride in glycerine (*i.e.*, glycerine from a bottle in which solid salt stands at the bottom) is added slowly from a teated pipette, marked to deliver 0.9 c.cm. and thoroughly mixed with the fæces by means of the wire plunger, which is washed with the last drop or two of glycerine. The mixture is covered with the piece of slide and does not quite fill the space. The glycerine is sufficiently viscous not to flow out, if carefully handled. The preparation is then set aside for 30 minutes to allow the eggs to float to the surface, and should be examined within 2 hours after which eggs tend to become crenated or translucent. With a low power 2/3 inch objective focused on the air bubbles all the hookworm eggs are easily seen on the same focal plane, just below the covering slide. It is found that a 1 in 10 emulsion of fæces of this depth (1.7 mm.) is sufficiently translucent for eggs to be seen over underlying particles of debris, though if these are dense the light may have to be increased slightly by opening the iris diaphragm of the condenser. Very large particles do not usually enter the pipette used for measuring, and if they do the specimen should be discarded and the process repeated. All eggs in the area, which is slightly less than a square inch, are counted, and the count multiplied by 10 gives the number of eggs per cubic centimetre of stool. Systematic counting is facilitated by a card disc with a square hole cut in the centre dropped on to the diaphragm inside the eyepiece, thus making a square field. The whole procedure takes only a few minutes, little longer than an ordinary qualitative examination of stool, but as a measured quantity is taken results are comparable. Moreover searching of the whole area ensures an adequate examination, and the volume of stool examined is that of 8 or 10 ordinary coverslip preparations of the same size. Roundworm, tapeworm*, whipworm and threadworm eggs are also easily seen by this method, if present, and strongyle eggs in dung from the hospital cows have also been found by this means.

Some points in the above technique need further comment. *Flotation fluid.* (*a*) *Specific gravity.*—Sodium chloride dissolves in glycerine (impurities about 1.5 per cent) to the extent of 9.78 per cent giving a solution of specific gravity

[* It is not clear which species of tapeworm eggs are referred to, but saturated salt solution in water by flotation or D.C.F. will not bring up *tænia* eggs; eggs of *Hymenolepis* spp. are floated in this solution.—EDITOR, *I. M. G.*]

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very nearly 1.300 (1.2964) [Herz and Knoch, 1905, (Seidell, 1920)]. This is higher than either pure glycerine (1.2592), or a saturated aqueous salt solution (1.1960), or a saturated solution of salt in a mixture of any proportions of glycerine and water. Barber (Stitt *et al.*, 1938) used a mixture of equal parts of glycerine and saturated salt solution which according to Herz and Knoch's tables gives a specific gravity of about 1.230. Lane [1925 (Lane, 1940)] has shown that for *Ascaris* and *Trichuris* eggs D.C.F. with a solution of specific gravity 1.200 gave about half the number of eggs as with one of 1.300. The ease with which these heavier eggs are floated by the 1.300 solution used by the writer would indicate a still greater ability to float hookworm eggs, and no trouble was experienced by debris also being floated.

(*b*) *Viscosity.*—Lane (*ibid.*) showed that with a specific gravity of 1.200 a sugar solution raised hookworm eggs more slowly than did one of common salt. Saturated salt in glycerine is rather viscous so comparative tests were done with aqueous solutions of magnesium sulphate and zinc sulphate adjusted to the same specific gravity of 1.300, the viscosity of the three solutions lessening in that order. Comparable results were obtained with all three. The differences were not significant, but the glycerine salt solution seemed to float eggs slightly better than the others.

The fæcal emulsion.—Loss of eggs in preparing the specimen cannot occur as the measured volume of stool is transferred directly to the counting chamber. The only possibility of eggs being missed is if they are prevented from floating to the surface by particles of debris. This can be lessened by thorough mixing on the slide and allowing time for the eggs to float up. While admitting that in concentrated emulsions more eggs are likely to be held down by fæcal debris than in weaker ones it must be remembered that in this technique eggs only have to rise through the fluid in a given time a maximum distance of 1.7 mm. The area of nearly one square inch should be sufficient for rising and falling streams of particles to avoid each other. The use of wire gauze strainers with their uncertain effects in holding up hookworm eggs is avoided by the narrowness of the bore of the pipette used for measuring which prevents coarse matter from entering.

Time of floatation.—The highest counts were obtained after about 1 hour, though from 30 minutes to two hours they were but little lower.

Accuracy.—In use we find the method sensitive in detecting hookworm eggs though, as it has been the only method employed, no comparative figures can be given. Its sensitivity is confirmed by the fact that only 4 negatives were encountered in a series of 116 routine examinations of the stools of 'healthy' school children (3.4 per cent). The degree of accuracy that may be expected is shown by the following table giving the results of three separate counts on each stool specimen :—

Count 1	Count 2	Count 3	Average
3,480	3,330	3,450	3,420
3,510	2,570	3,090	3,060
2,870	2,200	2,480	2,520
2,700	1,720	2,200	2,210
1,120	1,350	1,200	1,220
1,200	1,320	1,120	1,210
880	1,530	1,060	1,160
1,110	1,320	1,000	1,140
1,000	720	890	870
520	470	580	570
420	480	510	470
240	520	440	400
300	270	370	310
180	60	140	130
130	110	60	100
70	30	20	40

Reference to this table will show that, although there are discrepancies here and there, no one count differs so markedly from the average as to give a totally misleading clinical picture. Using this method of counting as a basis, results may be grouped as follows:—

Group 1. Light infestations : Count in the tens (10—90 eggs per c.cm.).

Group 2. Moderate infestations : Count in the hundreds (100—990 eggs per c.cm.).

Group 3. Heavy infestations : Count in the thousands (1,000—9,990 eggs per c.cm.).

Group 4. Very heavy infestations : Count in (10,000 and over eggs per c.cm.).

The highest count we have recorded since using this method is 10,500, but very heavy infestations are not common in our district. It is as easy to return the actual count obtained as to record the group number in which it falls, but when considering the result the margin of error should be remembered.

A high degree of accuracy is not necessary for clinical purposes and cannot be achieved by any method. Several sources of variation are possible, some of which affect all counting methods equally. For instance, we have no guarantee that gravid female hookworms lay eggs at a uniform rate to enable an individual to pass them out in his stool in the same concentration each day. Diet, the taking of purgatives and the physical state of the stool whether solid or liquid, all these may affect the count whichever method is employed. Sampling errors due to uneven dispersion of eggs in the stool are lessened in a method such as Stoll's (Stitt *et al.*, 1938) where 5 grammes of fæces are taken, but this advantage is offset by the fact that only 1/500th part of this quantity (0.01 gramme) is actually counted for eggs, and the multiplying factor being 100, counts below this figure are not shown. In Clayton Lane's (Stitt *et al.*, 1938) D.C.F. method pushed to finality all the eggs from 1 c.cm. of stool are counted, but this is too laborious for routine clinical use. Apart

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from everything else the mere counting of eggs in specimens where the count may run into thousands is no mean feat. Even if only the first coverslip is examined some 750 or 800 eggs must be counted in a specimen containing say 1,000 eggs per c.cm. In the method now described 0.1 c.cm. of stool is taken in a way which tends to lessen sampling errors, and in such a specimen only 100 eggs would have to be counted. Stoll's method would show ten eggs only, but this is more suitable for very large counts extending, for instance, up to 54,000 in Napier *et al.* (1941) series of cases. The writer has unfortunately had no opportunity of comparing his technique with D.C.F., which has been shown to produce most eggs from a given stool specimen. But even if the maximum number of eggs is not obtained, provided the method is reasonably sensitive in detecting and reliable in grading hookworm infestations, it will be of value to clinicians in small hospitals, private practitioners and those without access to elaborate laboratory facilities, as it can be carried out by anyone possessing a microscope.

It may be argued in view of the above difficulties and sources of error, coupled with the fact that the egg count of the stool cannot always be correlated with the patient's clinical condition, that routine egg counts are unnecessary and a waste of time. This argument carries more weight when the counting method employed is separate from the qualitative examination. But the present method combines both and is quick. A return of the number of eggs per c.cm. is of more value to the physician in charge of the case than a mere return of their presence, when no indication is given whether they number in tens, hundreds, or thousands. Routine stool examinations of all patients admitted to our hospital show that a high percentage are infested, though in varying degrees. Patients may be suffering from several different diseases, and the count helps the physician to assess the importance of hookworm in the whole clinical picture. Small counts may safely be ignored or treatment deferred until more urgent conditions have been treated.

Similarly, when considering counts from routine examinations of school children, low counts need not be treated in the absence of anæmia or other indication. For instance, in the group of 116 school children referred to above, 41 (35.4 per cent) were lightly, 68 (58.6 per cent) were moderately, and 3 (2.6 per cent) were heavily infested. All moderate and heavy infestations were treated, but light infections were only treated if there was anæmia, as shown by a hæmoglobin of less than 80 per cent (Sahli : standard 14 grammes Hb. = 100 per cent). It should be mentioned that, as the children come daily from scattered villages, no attempt at hookworm 'sterilization' of the community was feasible. The average egg count for the whole school worked out at 245 eggs per c.cm. It will be interesting to see, when the routine examination is repeated next year, whether as a result of treatment this figure is lower.

The method also provides a useful check of the efficacy of any method of treatment, as carried out in a particular institution. While it is admitted that, for research purposes and the large scale testing of any new drug, egg counts must be supplemented by worm counts from recovered stools, this latter process is tedious and objectionable, and impracticable for most workers. It is submitted that useful clinical material could be obtained from field workers using this method of egg counting, which would otherwise be wasted. For this reason, a table is given below of unselected cases in which repeat counts have been done after treatment. Unfortunately these are only a small minority of cases treated, as most patients do not stay long enough. In many cases in this series, treatment has not been successful in eliminating all eggs, though in nearly all cases the count has been greatly reduced. When treatment succeeds in reducing a patient's count from say 3,000 to 300 and he feels so much better that he goes home, though from a scientific point of view we cannot say he is cured, it is not fair to the method of treatment to exclude such a case from a series. A system of marks is therefore suggested as follows :—

Group 4 cases :	Reduction of count in same group	1 mark	
	„ „ „ to group 3	2 marks	
	„ „ „ „ 2	3 „	
	„ „ „ „ 1 (or 0)	4 „	(maximum)
Group 3 cases :	„ „ „ in same group	1 mark	
	„ „ „ to group 2	2 marks	
	„ „ „ „ 1 (or 0)	3 „	„
Group 2 cases :	„ „ „ in same group	1 mark	
	„ „ „ to group 1 (or 0)	2 marks	„
Group 1 cases :	„ „ „ in same group (or 0)	1 mark	„

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Marks obtained can be expressed as a percentage of marks possible and this figure would be an approximate index of efficiency for the treatment.

The treatment used was in nearly all cases 2 c.cm. of carbon tetrachloride with 1 c.cm. oil of chenopodium made up with magnesium sulphate 15 grammes and water to 30 c.cm.,

TABLE

Case number	Age	Sex	Initial count	First treatment marks	Count after treatment 1	Second treatment marks	Count after treatment 2	Third treatment marks	Count after treatment 3	Fourth treatment marks	Count after treatment 4
			Group 4								
1	8	M.	10,500	3/4	280	2/2	90	..	..	..	..
			Group 3								
2	50	M.	4,300	2/3	240	2/2	30	..	..	..	..
3	16	M.	3,800	1/3	1,100	2/3	210	1/2	130	..	..
4	50	M.	3,500	2/3	210	..	..	..	..	..	..
5	5	M.	2,520	2/3	490	1/2	200	2/2	0	..	..
6	25	F.	2,450	2/3	280	0/2	290	1/2	140	..	..
7	12	M.	2,210	3/3	0	..	..	..	..	..	..
8	9	M.	1,960	2/3	900	..	..	..	..	..	..
9	9	M.	1,810	3/3	10	..	..	..	..	..	..
10	14	M.	1,800	2/3	490	..	..	..	..	..	..
11	14	F.	1,440	3/3	90	..	..	..	..	..	..
12	30	F.	1,020	2/3	320	2/2	20	..	..	..	..
			Group 2								
13	50	F.	930	2/2	0	..	..	..	..	..	..
14	17	M.	920	1/2	130	..	..	..	..	..	..
15	40	F.	910	1/2	800	1/2	120	2/2	50	..	..
16	30	M.	890	2/2	60	..	..	..	..	..	..
17	16	M.	890	0/2	980	1/2	310	1/2	190	1/2	130
18	12	M.	850	2/2	30	..	..	..	..	..	..
19	9	M.	810	1/2	310	..	..	..	..	..	..
20	18	F.	810	2/2	90	..	..	..	..	..	..
21	11	F.	810	2/2	0	..	..	..	..	..	..
22	28	F.	780	2/2	0	..	..	..	..	..	..
23	37	M.	730	1/2	290	2/2	0	..	..	..	..
24	11	F.	730	1/2	180	2/2	0	..	..	..	..
25	14	F.	640	1/2	110	..	..	..	..	..	..
26	14	M.	580	1/2	330	1/2	120	2/2	70	1/1	30
27	30	F.	530	1/2	280	2/2	20	..	..	..	..
28	30	F.	450	1/2	210	2/2	0	..	..	..	..
29	21	F.	440	2/2	30	..	..	..	..	..	..
30	18	M.	410	2/2	40	..	..	..	..	..	..
31	25	F.	400	2/2	0	..	..	..	..	..	..
32	21	F.	400	2/2	0	..	..	..	..	..	..
33	8	F.	390	2/2	0	..	..	..	..	..	..
34	22	M.	390	1/2	150	..	..	..	..	..	..
35	20	F.	370	2/2	20	..	..	..	..	..	..
36	30	F.	370	2/2	0	..	..	..	..	..	..
37	23	F.	370	1/2	100	2/2	0	..	..	..	..
38	30	F.	350	0/2	390	2/2	20	..	..	..	..
39	7	F.	350	2/2	0	..	..	..	..	..	..
40	7	F.	340	2/2	20	..	..	..	..	..	..
41	45	F.	310	1/2	170	..	..	..	..	..	..
42	11	F.	310	1/2	120	..	..	..	..	..	..
*43	10	M.	290	0/2	450	0/2	530	..	..	..	..
44	23	F.	280	2/2	0	..	..	..	..	..	..
45	32	F.	230	1/2	130	..	..	..	..	..	..
46	30	F.	220	2/2	0	..	..	..	..	..	..
47	35	M.	200	2/2	0	..	..	..	..	..	..
48	10	F.	140	2/2	70	1/1	0	..	..	..	..
49	18	F.	140	2/2	30	..	..	..	..	..	..
50	27	F.	140	2/2	90	..	..	..	..	..	..
51	20	F.	130	2/2	50	..	..	..	..	..	..
Total marks ..				85/115 (74%)	..	25/34 (74%)	..	9/12 (75%)	..	2/3 (67%)	..
„ groups 3 and 4 ..				27/37 (73%)							
„ „ 2 ..				58/78 (74%)							

Total whole series 121/164 = 73.8% (76 treatments)

*This patient might have been reinfected but is retained in the series as the counts might be within the possible margin of error.

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administered fasting in the morning after a preliminary glucose drink. In a few cases 3 c.cm. of carbon tetrachloride was similarly given without the chenopodium. The dose was regarded as a full dose for an adult man or well-built woman, but in these hills they only weigh 7 or 8 stones. Smaller doses were given to other women and to children. A scale of dosage we have been using latterly is 1 c.cm. of the above mixture for every 4 lbs. of body-weight which is almost exactly the same as 1 drachm per stone of body-weight.

This method of marking would seem to be fair to the method of treatment, whether in heavy or moderate cases of infestation, as the index is practically the same in both groups. But within any group there should be fairly even dispersal of cases, for it is obviously easier for a drug to score full marks by depressing a count from 100 to the group below than from 990 to the group below. In a large series this cancels out, and there is nothing to be gained by making the groups smaller, the groups as suggested being quite sufficient for clinical purposes. It is also interesting to note that almost the same index is obtained for second and third treatments. Here any reduction in efficiency that might be expected from drug-fastness of the worms is possibly offset by the fact that the first treatment in most cases reduces the count to the lower half of the group 2, so that there is no longer a random dispersal. Of course, this is too small a series from which to draw conclusions, but the efficiency index obtained in this way agrees with one's clinical impression of the efficacy of the method of treatment.

Summary

1. A simple direct method of examining stools for hookworm and other helminth eggs is described by which eggs may be counted.
2. A modified glycerine-salt floatation technique is used with simple apparatus that can be made in any laboratory.
3. It seems sensitive as a qualitative method, so that no other examination for ova is made.
4. It has not been compared with standard methods of enumeration and it is stressed that it is intended for clinicians rather than research workers.
5. The results are sufficiently accurate to be of clinical value, and it is pointed out that great accuracy cannot be achieved by any method.
6. Using this method of egg counting as a basis a simple classification of grades of hookworm infestation is suggested.
7. The clinical value of egg counts is discussed.
8. A possible method of evaluating the efficacy of treatment is put forward, illustrated by a small series of cases.

In conclusion I would thank Dr. Stanley F. Thomas and Dr. Honor E. C. Wilkins for the use of some of their cases, and all the staff of the hospital for their help. I would also gratefully acknowledge advice received from Professor Maplestone and Professor Ghosh of the Calcutta School of Tropical Medicine.

(Concluded at foot of next column)

THE APPLICATIONS OF THE VITAMIN-C TEST FOR OVULATION IN THE DIAGNOSIS OF HORMONAL DISORDERS

By A. P. PILLAY, O.B.E., M.B., B.S.

Bombay 1

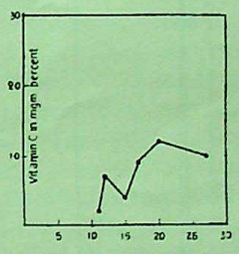
IN my first two papers on the subject (Pillay, 1940, 1940*a*), I explained how the vitamin-C test for ovulation can ascertain :—

(*i*) Whether a particular menstrual cycle is anovulatory, uniovulatory, or multiovulatory.

(*ii*) If ovulatory, the actual day of ovulation. The belief is still prevalent even among educated persons that conception can take place only just before or after menstruation. Knowing the day in a cycle on which alone the woman can conceive is most helpful in cases where the husband suffers from oligospermia and oozspermia. I am utilizing this test in the series of sterility cases I am at present studying.

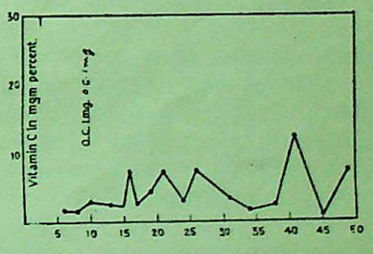
(*iii*) Whether a woman is pregnant. It was mentioned that a consistently high excretion of vitamin C in the urine of a woman who has missed her 'period' is an indication of pregnancy. Graph 1 is the urine chart of a pregnant woman and graph 2 that of a case of secondary amenorrhœa.

Graph 1.



Days of the cycle.

Graph 2.



Days of the cycle.

(*iv*) In incomplete abortion also, there is a consistently high excretion of vitamin C in the urine. Graph 3 is that of such a case. The test may, therefore, be useful to diagnose

(Continued from previous column)

REFERENCES

LANE, C. (1940) .. *Trans. Roy. Soc. Trop. Med. and Hyg.*, **33**, 521.

NAPIER, L. E., DAS GUPTA, C. R., and MAJUMDAR, D. N. (1941). *Indian Med. Gaz.*, **76**, 1.

SEIDELL, A. (1920) .. *Solubilities of Inorganic and Organic Substances*. Crosby Lockwood and Son, London.

STITT, E. R., CLOUGH, P. W., and CLOUGH, M. C. (1938). *Practical Bacteriology, Hœmatology and Animal Parasitology*. H. K. Lewis and and Co., Ltd., London.

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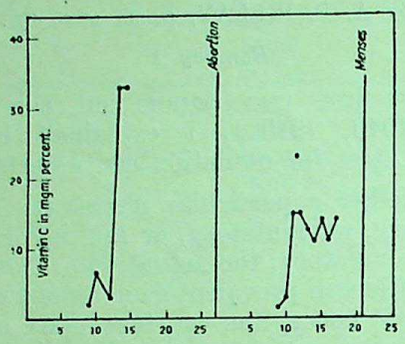
whether any pieces of placenta are left in the uterus in doubtful cases.

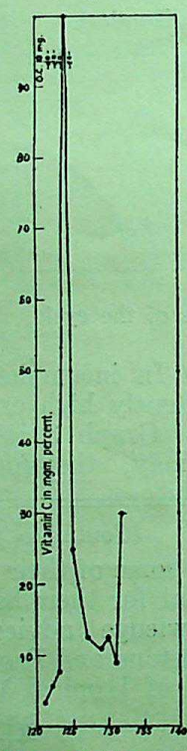
Graph 3.



Days of the cycle.

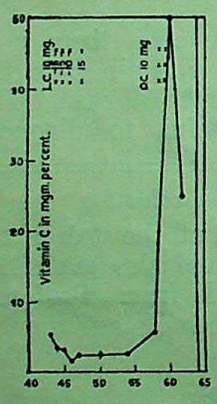
(*v*) It was mentioned in my last paper (Pillay, 1940*a*) that during the administration of oestrin, the excretion of vitamin C in the urine is *low*, while it is *high* when luteal hormone is administered. I find now that in pregnant women the effect of the administration of these hormones on the excretion of vitamin C in the urine is just the reverse, *i.e.*, when oestrin is administered the excretion is *high* and *low* when luteal hormone is administered. Graphs 4 and 5 illustrate this point. The vitamin-C test can, therefore, be used in two ways in diagnosing pregnancy.

Graph 5.



Days of the cycle.

Graph 4.

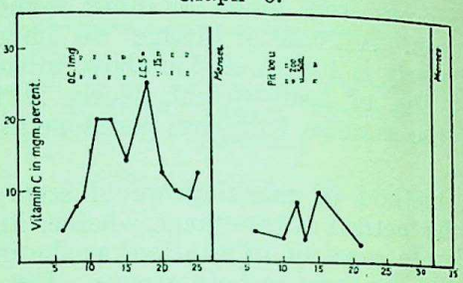


Days of the cycle.

(*vi*) There is, as far as I know, only one fallacy in using the test for diagnosing pregnancy, and that is in pituitary hypofunction where a similar picture is seen, *i.e.*, the excretion of vitamin C is *high* when oestrin is administered and *low* when the luteal hormone is administered.

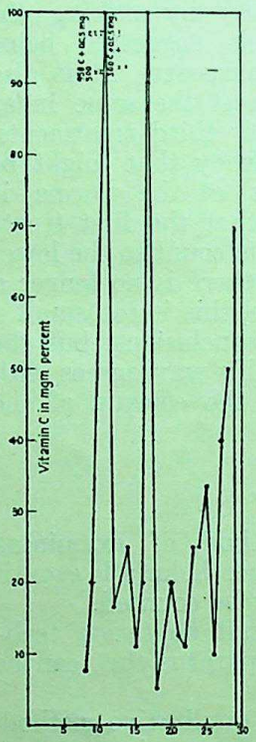
Graph 6 depicts two menstrual cycles of a woman of pituitary hypofunction. She was suffering from secondary amenorrhœa and the pituitary type of obesity. The last menses was two months previously. In the first cycle ovocyclin P and leutocyclin were administered by injection consecutively and in the second cycle prehormon was given. It will be noticed that the latter exerted no influence on vitamin-C excretion. The treatment regularized her menses but the obesity remained the same.

Graph 6.



Days of the cycle.

Graph 7.

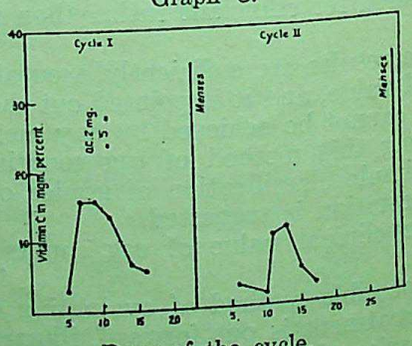


Days of the cycle.

Graph 7 is that of a normal case without any hormonal deficiency. In pituitary hypofunction the vitamin-C excretion is *low* in the luteal phase of the menstrual cycle, while, as was shown in my previous papers, it is comparatively *high* in normal cases.

Graph 8 is illustrative of this phenomenon.

Graph 8.



Days of the cycle.

Graph 9 is that of a case of sterility diagnosed in England as one of pituitary hypofunction. The vitamin-C tests showed anovulation in the

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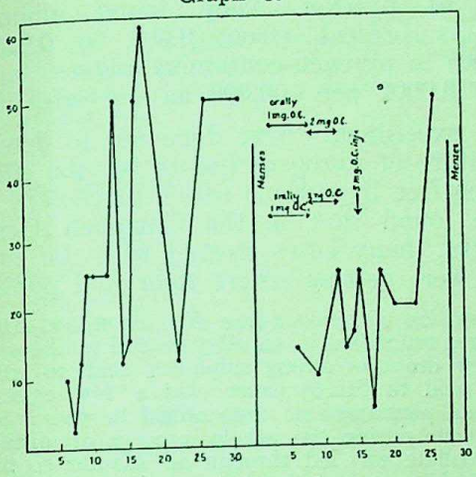
first cycle and when ovocyclin was administered in the second cycle, there was ovulation, proving conclusively that it was a case of hypogonadism and not of hypo-pituitarism. She became pregnant without any other treatment. The vitamin-C test thus helps in diagnosing pituitary hypofunction.

Graph 9.

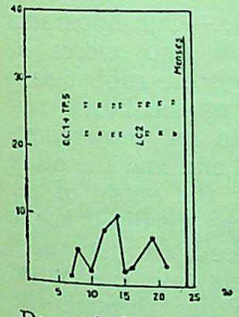


Days of the cycle.

(*vii*) The graph (10) of a case of infantile uterus treated with a combination of ovocyclin P, lutocyclin and perandren is given.

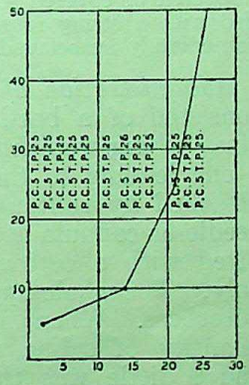
(*viii*) In striking contrast to the above graphs is graph 11, that of a male while being treated for psychic aspermia (no seminal discharge) with perandren and percorten.

Graph 10.



Days of the cycle.

Graph 11.

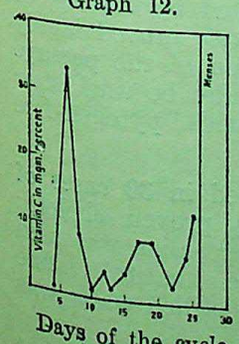


Days of the cycle.

(*ix*) I have noticed during the course of my experiments a few atypical and irregular graphs. See graphs 2, 12 and 13. It may be mentioned that in asthenia and constitutional disorders such graphs are common. See graph 12 which is that of a case of bronchitis.

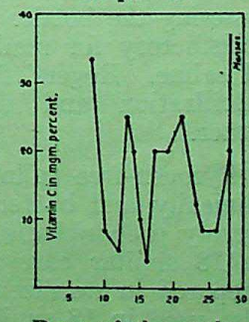
There were other cases in which no constitutional cause was present. Curiously, such graphs were seen in cases where the menses were irregular and the menstrual cycle prolonged. They were also noticed in cases of sterility and in no case has the woman conceived in a cycle in which such irregularity was noticed. Such irregularity often alternates with the normal picture when conception is possible. The woman whose graph is no. 12 conceived two cycles later.

Graph 12.



Days of the cycle.

Graph 13.



Days of the cycle.

It was suggested that the atypical urine picture might be due to some substance present in the urine. Complete chemical and bacteriological investigation failed to show any substance likely to affect the dye solution. I am inclined to think that such cycles are anovulatory, caused by deficient follicular hormone, treatment with which usually brings the cycle to normal. The test is therefore helpful in diagnosing ovarian hypofunction. Out of 87 cycles studied, the irregular picture was seen in 19 cycles—5 cycles in women with irregular menses, 11 in cases of sterility and 2 in cases for which no explanation was possible. Out of 40 cycles of sterile woman studied, 11 cycles were irregular. It is believed that salicylates upset the vitamin-C test and such drugs are therefore forbidden.

(*x*) If the day of ovulation is known by the vitamin-C test, it can be utilized as a birth-control measure. I have discussed this subject in detail elsewhere (Pillay, 1941). Suffice it to say here that as multi-ovulation is possible in any cycle, the tests have to be carried out right through the end of every cycle.

Explanatory note.—In my previous papers, I offered no explanation why the vitamin-C test of urine for ovulation makes it possible to diagnose hormonal variations in the system. Even now I can think of no satisfactory explanation. In this paper one point stands out clear, *viz,* when prolan is excreted in the urine, as in pregnancy, the tests show a picture just opposite to the normal.

The vitamin-C test and the interpretation of the graphs in this paper are the same as those described in my last.

In the graphs

C. stands for redoxon (Roche)
O.C. „ „ ovocyclin P
L.C. „ „ lutocyclin
T.P. „ „ perandren
P.C. „ „ percorten—all products of Ciba Ltd.

Summary.—The vitamin-C test for ovulation helps—

(*i*) in diagnosing pregnancy and incomplete abortion,

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TREATMENT OF CHOLERA WITH PYROGEN-FREE SALINE

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From the Cholera Bacteriological Inquiry, Indian Research Fund Association, School of Tropical Medicine, Calcutta)

THE word 'pyrogen' literally means a substance that gives rise to pyrexia or fever when parenterally introduced into the body.

Pyrogens are filterable thermostable products of the growth of certain strains of bacteria falling within the group X described by Jordan. The organisms are ubiquitous and infect any water that is not kept absolutely sterile. They grow rapidly in distilled water; large quantities of pyrogens can be formed in a day at room temperature, and ordinary autoclaving does not destroy them. Water can be freed from them by distillation, but droplets should not pass over during the process. Pyrogens are readily destroyed by the addition of an acid or alkali to the water and the subsequent application of heat. They are particulate, the size being between 1 and 50 millimicrons and they contain nitrogen. Carter (1930) has described a test for pyrogens in water by boiling in dilute sulphuric acid and potassium permanganate solution, and has thereby indicated a method of preparation of pyrogen-free distilled water. Others have given a method of freeing water from pyrogens by shaking with charcoal.

The reaction produced by the injection of pyrogens is essentially characterized by rigor, and by feeling of chill. These may occur within 15 minutes or may be delayed up to 18 hours. The reaction is followed by profuse sweating and fall of temperature. There may be nausea, vomiting, headache and albuminuria. Death has sometimes occurred.

(*Continued from previous page*)

(*ii*) in diagnosing pituitary and ovarian hypofunction, and

(*iii*) in the treatment of sterility.

No satisfactory explanation is possible as to why it is so.

Acknowledgment.—For this study redoxon and the dye tablets were supplied free of cost by Messrs. Hoffman La Roche and the hormonal products by Messrs. Ciba Limited.

REFERENCES

PILLAY, A. P. (1940) .. *Indian Med. Gaz.*, **75**, 91.
Idem (1940*a*). *Ibid.*, **75**, 668.
Idem (1941) .. *Birth Control Simplified.* D. V. Taraporevala Sons and Co., Bombay.

The use of saline made with pyrogen-free water for therapeutic purposes can be dated from 1937–38. Thomas and Ting (1938) used freshly distilled water for making saline for cholera cases and obtained no reaction. Knott and Leibel (1941), in their article 'Prevention of pyrexial reactions in intravenous therapy', indicated foreign protein as being the commonest cause of pyrexia. They found albuminoid ammonia present (from 0.005 to 0.025 per 100,000) in pyrogen-containing waters, and suggested 0.0002 per 100,000 as the safe limit.

Our experiments were done not to determine the nature of pyrogens but to see the effect of pyrogen-free hypertonic saline in cholera cases, as we found that in the Campbell Hospital, Calcutta, many cases treated with the hospital saline were getting severe rigor and pyrexia.

Preparation of pyrogen-free distilled water.—Distilled water was redistilled in an all-glass still in the presence of a few drops of strong sulphuric acid to make it faintly acid to litmus paper, and a few crystals of potassium permanganate were added to give it a faint pink colour during the whole process of distillation. The distillate was led through an adapter so that no drops could pass over into the receiver. The preparation of the receiver was important. It was made of Jena glass, 'Pyrex' or neutral, cleaned thoroughly with hot 10 per cent solution of potassium dichromate in 10 per cent sulphuric acid, washed with pyrogen-free distilled water and then autoclaved. The mouth of the receiver was covered with a clean wooden or cardboard disc with a central hole for the adapter to pass through. When sufficient pyrogen-free water was collected, it was measured in a clean sterilized cylinder and the required quantity of pure sodium chloride was added. The mouth of the receiver was either glass-stoppered or covered with a piece of clean, thick paper tied with a string round the neck, and the whole was immediately autoclaved. No rubber corks were used.

Administration of the saline.—Our apparatus consisted of a bottle in which two pieces of glass tubing were fitted through the rubber cork —one leading to the bottom of the bottle and attached by rubbing tubing to an intravenous needle or cannula at the distal end and the other fitted with a cotton plug for the entry of air only. The whole apparatus was sterilized in the autoclave. When it was used, a measured quantity of saline was poured into the bottle and a little was then blown out through the cannula. To ensure that the saline was running into the vein, a small U-tube, partly filled with a little sterile water, was fitted to the air entry tube. Bubbles of air aspirated through the U-tube indicated the rate of flow of the intravenous saline, which was regulated by raising or lowering the bottle. This device proved highly satisfactory for ready detection of the passage of saline. Rogers' flask can also be used after sterilization and washing with pyrogen-free water.

Pyrogen-free saline was used in 30 cases of clinically and bacteriologically proven cholera; freshly prepared distilled-water saline was used in 18 similar cases; and the hospital saline prepared in sterilized tap or distilled water was also used in 18 similar cases.

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The results are given below :—

	Number of cases treated with pyrogen-free saline	Number of cases treated with freshly distilled water saline	Number of cases treated with hospital saline ordinarily prepared
1. Rigor only	3 (10%)	1 (5.5%)	5 (27.8%)
2. Both rigor and high temperature.	1 (3.3%)	3 (16.6%)	12 (66.6%)
3. No rigor, no rise of temperature.	14	10	0
4. Rise of rectal temperature only 1°F., highest limit being 104.4°F.	6	3	1
5. Fall of temperature more than 1°F., lowest limit being 98.2°F. and no rigor.	6	1, rigor +	0
	30	18	18

The above table shows that with pyrogen-free saline in only one case were there both rigor and high temperature and that (14 + 6), *i.e.*, 20 cases out of 30, had neither rigor nor rise of rectal temperature. On the other hand, out of 18 cases treated with hospital saline, 12 had both rigor and high temperature and all had either rigor or temperature. Pyrogens had been largely eliminated in the saline prepared in freshly distilled water and hence only 3 cases had both rigor and temperature and 10 cases out of 18 had neither.

As a rule the hospital saline is not used in cases showing rectal temperature above 100°F. Iced rectal saline is used first to bring down the temperature and then intravenous saline is administered so as to minimize the risk of complications. Pyrogen-free saline, however, was used by us in 11 cases with a high rectal temperature, without any untoward effects.

The results are given in the following table :—

	Pyrogen-free saline
1. Rise of rectal temperature ..	0
2. No rise or fall of temperature and no rigor	6
3. Fall of temperature and no rigor	5
TOTAL ..	11 cases

(*Concluded at foot of next column*)

NYLON

By F. V. STONHAM

MAJOR, I.M.S.

NYLON is a synthetic textile produced by a process of polymerization from such unromantic raw materials as coal, water and air. It is a substance of remarkable strength, elasticity, and flexibility. It is almost completely waterproof, resistent to heat and unaffected by a large number of chemical substances. Various fine fabrics, stockings, etc., made from this substance were found to be extremely resistant to wear and rough treatment in the laundry, and fishing lines made from it were found to be capable of being stored in a wet condition for long periods without deterioration. Its properties suggested that it might be of value in surgery as a suture material, and it has now been placed on the market by the American firms, Davis and Geck, A. J. Deknatel and Son, Bauer and Black, and more recently I. C. I. (Plastics), Ltd., have manufactured it in England for surgical purposes.

Nylon has the following advantages :—

1. It is of great strength.
2. It is insoluble and able to take up minute quantities of moisture only.

(*Continued from previous column*)

It will be seen that there was no rise of rectal temperature in any case. On the contrary, in about half the cases, the high rectal temperature came down giving comfort to the patients. Rigor was absent in all the eleven cases.

Summary

1. Pyrogen-free water is prepared by mixing water with a little sulphuric acid and potassium permanganate and then distilling the mixture in an all-glass still. Water is collected in a specially prepared receiver. The saline is prepared with this water and immediately sterilized, and can be stored.
2. The saline is given in cholera cases, with a suitable outfit, indicating its regular inflow.
3. The pyrogen-free saline gave rise to rigor or hyperpyrexia in only a small proportion (13.3 per cent) of cases, whereas the pyrogen-containing saline prepared with sterilized water produced the pyrogenic reactions in 94.4 per cent of cases.
4. Pyrogen-free saline can safely be administered in cases with a high rectal temperature.

Our thanks are due to Dr. B. C. Chatterjee, the officer-in-charge of the cholera ward of the Calcutta Campbell Hospital, for kindly giving us all facilities for work on his cases and taking a keen interest in our experiments.

REFERENCES

CARTER, E. B. (1930) .. *J. Lab. and Clin. Med.*, **16**, 289.

KNOTT, F. A., and LEIBEL, B. (1941). *Lancet*, *i*, 409.

THOMAS, H., and TING, L. C. (1938). *Chinese Med. J.*, **54**, 358.

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3. It appears to be unaffected by repeated boiling, or repeated dry sterilization, or by antiseptics (except phenol).

4. It appears to have no deleterious effect on tissues and it is unaffected by digestive enzymes.

5. It can be readily knotted even when dry, and the knots have little tendency to slip except in the case of the largest sizes.

6. It can be provided in any length and is therefore useful for closure by continuous suture of wounds, however large.

7. The calibre is perfectly even and cylindrical and there are no weak spots as are commonly found in silkworm-gut.

8. It possesses moderate elasticity.

Nylon is obtainable in two forms. It can be made into a solid gut-like cylinder as a substitute for silkworm-gut, or fine threads may be woven into a braided thread similar to braided silk.

Trial supplies were kindly placed at the disposal of the writer by the firms alluded to above. Solid nylon filaments were used for tension sutures, and for skin closure by various methods of stitching, including subcuticular sutures, in a variety of operations, with complete satisfaction. There was no irritation around the stitch holes, and the material knotted readily, and the knots had no tendency to 'give' except in the coarsest sizes, in which this was overcome by using the triple knot. Knots could be roughly tied and tightly pulled without any breakage occurring. Silkworm-gut of approximately equal size breaks readily with similar treatment. By using long lengths on the needle, interrupted sutures could be inserted with a minimum of wastage. For this reason it is unfortunate that I. C. I. (Plastics), Ltd., supply their product cut up into 14-inch lengths.

Braided nylon thread was similarly used for skin closure with complete satisfaction.

Though a woven thread is inevitably porous, the non-hygroscopic nature of the material combined with 'hard' braiding reduced this feature to a minimum, and there is no practical disadvantage. Wounds were closed using nylon silk and silkworm-gut in the same wound. It was observed that there was a minimum of redness around the silkworm-gut and nylon, but there was distinctly more redness around the silk.

Nylon thread was also used for buried sutures without apparent ill effect and in operations including appendicectomy, cholecystectomy, nerve suture, radical cure of hernia, meniscectomy. Repair took place normally and there were no undesirable after-effects of any kind, though nylon was used exclusively. Removal of nylon sutures was painless and the wound scars were inconspicuous.

Sutures of solid and braided nylon together with silkworm-gut and silk were placed in an animal and removed for section after ten days. There appeared to be less tissue reaction around

(Concluded at foot of next column)

MOUSE PROTECTION TEST AS A METHOD OF DIAGNOSIS OF WEIL'S DISEASE—A CONTRADICTION

By B. M. DAS GUPTA

Department of Protozoology, School of Tropical Medicine, Calcutta

LARSON (1941) has pointed out that young mice (*Mus musculus*) are extremely susceptible to *Leptospira icterohæmorrhagiæ*. The mortality rate is approximately 100 per cent in the 3-week-old mice. As the cost of mice is much less than that of guinea-pigs and death occurs in them as early as, or earlier than, in guinea-pigs, they can be used for diagnostic inoculation in suspected cases of Weil's disease. But according to the same worker, most observers who have previously studied the question of susceptibility of white mice have expressed the contrary opinion. Possibly not being particular about the age of the experimental mice, they have used full-grown animals which are almost insusceptible to *L. icterohæmorrhagiæ*. In view of the importance of Larson's observations, it was thought worth while to investigate the susceptibility or otherwise of young white mice to Indian strains of *L. icterohæmorrhagiæ*.

Materials and methods

The strain of *L. icterohæmorrhagiæ* used for the first two experiments to be reported in this paper was isolated in September 1937 by culture of blood from a severe case of hæmorrhagic jaundice. It is an extremely virulent strain, guinea-pigs having succumbed to the infection following intraperitoneal injection of 0.5 c.cm. of the culture, in about a week. The culture was initiated on Fletcher's medium and has since been continued in Vervoort's medium.

(Continued from previous column)

the nylon than around the other sutures. In one case, a sciatic nerve had been sutured with fine braided nylon. The ends of the nerve had been sutured under tension with considerable difficulty, and six months later the wound was re-opened in order to resect a further portion of nerve and re-suture. Healing of the nerve sheath had been good and there was no reaction around the nylon sutures, and nothing was adherent to the knots. A neuroma was present which was anticipated, since it had been impossible to resect as much nerve as desirable in the original operation.

In the opinion of the writer after nearly two years' trial, nylon, as a suture material, is markedly superior to both silk and silkworm-gut. It can be used in almost any kind of clean wound. The solid strands are excellent for skin closure, while the fine braided thread, on account of its great strength and durability, makes it particularly suited to ophthalmic, nerve, and plastic surgery, or, in fact, any delicate work.

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The virulence of the strain has been maintained and enhanced by passage through young guinea-pigs approximately every third week. The spirochæte gave a titre of 1 in 10,000 with Wijnberg* antiserum.

For the third series of animals another strain was used. It was recovered from a case of Weil's disease by inoculation of urine into a guinea-pig on the very day of the commencement of the experiment. Three series of animals were experimented upon.

Series 1 and 2

A litter of 6 mice (*Mus musculus*), born 20 days previously, were selected. As Larson (*loc. cit.*) has noted that young mice tolerate at least 0.6 c.cm. of infected material administered intraperitoneally, these mice all received the same dose of a rich culture, the injection being given very slowly into the peritoneum.

The results are shown in the table.

On the seventh day of inoculation 2 of the survivors developed marked jaundice, particularly pronounced in the ears, tail and pads of the feet. Their peritoneal fluid was also coloured yellow, but showed no leptospira. Icterus, however, disappeared completely 4 days later and the animals looked quite healthy again.

At the same time 6 young guinea-pigs, weighing between 95 and 108 grammes, were inoculated in exactly the same manner, except that 2 animals received smaller quantities (0.5 and 0.42 c.cm. respectively), as an adequate quantity of the inoculum was lacking.

The results are shown in the table.

All the animals succumbed to leptospiral infection, leptospiræ being present in considerable numbers in the liver and kidneys, especially in the liver.

Series 3 and 4

Three 18-day-old mice and an equal number of guinea-pigs, weighing 102, 108, and 115 grammes respectively, were inoculated with a guinea-pig's liver emulsion containing a good number of leptospiræ. 0.6 c.cm. of the supernatant fluid from the 10 per cent emulsion was injected intraperitoneally into all these animals.

The results are shown in the table.

One of the surviving mice became definitely jaundiced on the 5th day but 3 days later it appeared quite normal again.

Series 5 and 6

A batch of four 21-day-old mice and 4 young guinea-pigs weighing less than 120 grammes were used in this series. These animals were also inoculated with the same dose as in the two previous experiments. The infective material consisted of liver and kidney emulsions of a guinea-pig infected with the urine from a case of Weil's disease.

The results are shown in the table.

Two of the surviving mice developed slight jaundice which passed off after two days.

In the case of the guinea-pigs, every death was due to leptospiral infection, spirochætes being invariably found in the organs.

TABLE

Series	Animals used	Number dying: by days							Number surviving after 3 weeks	Remarks
		1st	2nd	3rd	4th	5th	6th	7th		
1	Mice	..	1*	..	..	..	..	..	5	* Probably death was due to trauma caused by faulty inoculation.
2	Guinea-pigs	..	..	..	1	4	1	..	..	All died.
3	Mice	..	..	..	..	1*	..	..	2	* Died of leptospiral infection. Scanty leptospiræ found in the liver.
4	Guinea-pigs	..	..	..	1	2	..	..	..	All died of leptospiral infection.
5	Mice	..	..	..	..	..	1*	..	3	* This mouse became intensely jaundiced and died apparently of leptospirosis. The body was in an advanced stage of decomposition when seen next morning, rendering the autopsy useless.
6	Guinea-pigs	..	..	..	1	1	2	..	..	All died.

Two of the surviving mice developed slight jaundice which passed off after two days.

In the case of the guinea-pigs, every death was due to leptospiral infection, spirochætes being invariably found in the organs.

Summary and conclusion

Thirteen young white mice (*Mus musculus*) varying in age from 18 to 21 days and an equal

(*Concluded on next page*)

* Wijnberg strain = a classical strain of *L. icterohæmorrhagiæ*.

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CAN THE DETERIORATION OF ERGOT EXTRACTS BE PREVENTED IN THE TROPICS?

By I. B. BOSE, PH.D.
N. K. DEY, B.SC.
and
B. MUKERJI, M.D., D.SC.
(*Biochemical Standardization Laboratory, Government of India, Calcutta*)

MUKERJI (1938) reported that a very large proportion (86.13 per cent) of the ergot extracts examined at the Biochemical Standardization Laboratory was below strength and many specimens of this series were found to contain either a trace of or no active alkaloids at all. Bose, Dey and Mukerji (1941) studied the keeping properties of liquid preparations of ergot (*B. P.* 1932 and *B. P.* 1914 formulæ preparations) under various conditions of storage, exposure and hydrogen-ion concentration and came to the conclusion that samples of liquid extract of ergot, if kept at a pH in the neighbourhood of 3, and at low temperature inside a refrigerator, would undergo deterioration at a much less rapid rate than under ordinary conditions of storage in room temperature exposed to light. In view of the importance of ergot extracts in obstetrical practice in India, it is obviously of importance to discover ways and means by which ergot extracts could be stabilized under the climatic conditions existing in the tropics. Liquid extract of ergot is still the mainstay of the physician and though it is gradually being replaced in city hospital practice by the standardized active alkaloids of ergot, it is the drug of choice with the midwives in rural areas of India who can employ it in suitable cases of post-partum hæmorrhage without consulting the physician. The present investigation was taken up with a view to finding out if liquid extracts of ergot can at all be stabilized by the addition of certain chemical agents which are known to prevent deterioration in similar pharmaceutical preparations.

Experimental

A. *Method.*—A sample of liquid extract of ergot (approximate 2 litres; pH 2.5) was prepared according to the method laid down in *B. P.* 1932. The total alkaloidal content of this sample was determined and it was then divided into 6 equal parts. To each of these aliquots, the following reagents were added in the proportions shown against each :—

(1) An anti-oxidant, *e.g.*, hydroquinone 1.0 per cent.

(2) A stabilizing agent, *e.g.*, metaphosphoric acid, 0.5 per cent.

(3) An antiseptic agent, *e.g.*, merthiolate (sodium ethyl mercurithiosalicylate), 0.01 per cent.

(4) A reducing agent, *e.g.*, ascorbic acid, 0.1 per cent.

(5) A reducing agent, *e.g.*, ascorbic acid, 0.5 per cent.

(6) Control (without any reagent being added).

The six samples, thus treated, were then divided into two lots each. One set was kept in a refrigerator at 6° to 8°C. and the other set was maintained as usual under ordinary conditions in the laboratory shelf. Monthly determinations of the alkaloidal contents of these twelve samples were carried out regularly for the next 7 months.

In determining the total alkaloidal contents, the colorimetric method outlined in *B. P.* 1932 with the modification outlined in the *Addendum*, 1936, was employed all through, the colour comparisons being made with the help of a Zeiss Pulfrich photometer.

B. *Laboratory findings.*—The results obtained are expressed in tabular form (*see* tables I and II). It will be seen that conditions of treatment of the samples remaining the same storage at a low temperature in the refrigerator has a distinct influence on the rate of deterioration of liquid extracts of ergot. Another observation of significance is that none of the

TABLE I

Samples kept at ordinary room temperature (20° to 35°C.)

(1)	(2)	(3)	(4)	(5)	(6)
Control sample	With 1 per cent hydroquinone	With 0.5 per cent metaphosphoric acid	With 0.01 per cent merthiolate	With 0.1 per cent ascorbic acid	With 0.5 per cent ascorbic acid
59.83	59.83	59.83	59.83	59.83	59.83
47.40	50.13	48.77	46.03	55.87	59.83
42.35	41.17	36.06	38.79	52.86	57.10
30.33	25.54	26.64	28.41	46.03	46.72
24.72	20.35	22.95	24.72	42.35	44.80
24.72	13.25	17.08	21.17	36.61	44.80
19.12	13.25	17.08	17.89	32.37	39.89
13.25	8.33	11.06	13.93	26.50	37.70

(*Continued from previous page*)

number of young guinea-pigs weighing less than 120 grammes were inoculated with virulent *Leptospira icterohæmorrhagiæ*. All the guinea-pigs succumbed to the infection between the 4th and 6th days, whereas only two mice died of the infection on the 5th and 6th day. These experimental results clearly demonstrate the fact that even young specimens of white mice are much less susceptible to Indian strains of *L. icterohæmorrhagiæ* than young guinea-pigs and therefore on no account can they be regarded as suitable for protection tests in the detection of Weil's disease in this country.

REFERENCE

LARSON, C. L. (1941) .. *Pub. Health Rep.*, **56**, 1546 and 1593.

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TABLE II

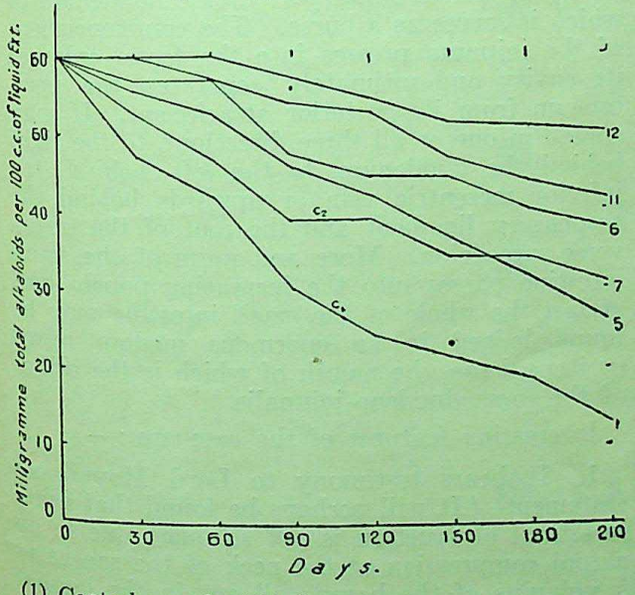
Samples kept in frigidaire (6° to 8°C.)

(7)	(8)	(9)	(10)	(11)	(12)
Control sample	With 1 per cent hydro-quinone	With 0.5 per cent meta-phosphoric acid	With 0.01 per cent merthio-late	With 0.1 per cent ascorbic acid	With 0.5 per cent ascorbic acid
59.83	59.83	59.83	59.83	59.83	59.83
52.86	54.37	57.37	54.37	57.10	59.83
47.40	54.37	46.03	50.13	57.10	59.83
39.34	54.37	43.57	44.12	54.09	54.37
39.34	48.77	39.89	37.70	52.86	54.37
34.42	44.12	34.42	36.61	47.40	51.50
34.42	44.12	34.42	35.52	44.12	50.82
30.33	40.57	30.33	31.83	41.12	50.13

N.B.—The figures indicate mg. of total alkaloids of ergot per 100 c.cm. of the liquid extract.

stabilizing agents except ascorbic acid has any demonstrable influence on the rate of deterioration. The influence exerted by ascorbic acid on ergot extracts is well marked both in room temperature as well as in the refrigerator, a strength of 0.5 per cent being more suitable to prevent rapid deterioration. The graph below brings out the point very clearly.

Graph showing influence of ascorbic acid on the stability of liquid extract of ergot



(1) Control sample (C_1) in room temperature.
(7) Control sample (C_2) in refrigerator.
(5) Ergot extract with 0.1 per cent ascorbic acid in room temperature.
(6) Ergot extract with 0.5 per cent ascorbic acid in room temperature.
(11) Ergot extract with 0.1 per cent ascorbic acid in refrigerator.
(12) Ergot extract with 0.5 per cent ascorbic acid in refrigerator.

Note how the deterioration is prevented by ascorbic acid even when maintained at room temperature. In the refrigerator with 0.5 per cent ascorbic acid (no. 12), the rate of deterioration is markedly checked.

Summary and conclusions

(1) Attempts have been made to check the rapid rate of deterioration of liquid extract of ergot (*B. P.* 1932) in tropical climates by the addition of preservatives, anti-oxidants and reducing agents such as hydroquinone, meta-phosphoric acid, merthiolate (sodium ethyl mercurithiosalicylate) and ascorbic acid.

(2) Ascorbic acid is the only agent which has a demonstrable effect on the stability of liquid extracts of ergot. Though 0.10 per cent is effective, 0.5 per cent has a much better action in this respect.

(3) In the interest of the consumers and in the interest of scientific medical practice, liquid extracts of ergot should not be allowed to be stored haphazardly under ordinary conditions exposed to heat and light. Even under the best of conditions of manufacture (*i.e.*, prepared from a good and potent batch of ergot and the extract maintained at a pH level of about 2.7), ergot extracts deteriorate rapidly in 7 to 10 months from the time of its preparation. This may be largely checked by the addition of ascorbic acid in 0.5 per cent concentration. Ethical manufacturers may help the cause of medical practice a great deal by adding ascorbic acid in adequate concentration to their liquid extracts of ergot and by advising pharmacists to store these in a cool place, or better in a refrigerator, wherever available.

REFERENCES

BOSE, I. B., DEY, N. K., and MUKERJI, B. (1941). *Trans. Med. College Reunion*, **4**, 83.
MUKERJI, B. (1938) .. *Indian Med. Gaz.*, **63**, 355.

A Mirror of Hospital Practice

IMPERFORATE EXTERNAL URINARY MEATUS IN A NEW-BORN CHILD

By S. KUNDU, M.B., A.M.S.
Assistant Surgeon, Civil Hospital, Silchar

IN November 1941 a male child was brought to me at the civil hospital, Silchar, with the history that it had not passed any urine since its birth 36 hours previously. The child was delivered in the maternity ward of the Siva Sundari Nari Sikhyasram, Silchar.

The child did not appear to be in any distress nor were there any signs of bladder distension. There were no signs of urine having been passed per rectum and this was confirmed on examination, which showed no internal or external vesical fistula. The corona glandis was well formed, but the prepuce was absent and a slight depression could be seen at the meatal site.

With a cataract knife a small incision was made at the depression and after going through a membrane one-sixth of an inch thick, the urethral cavity was entered.

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A no. 1 rubber catheter introduced through the incision was passed into the bladder without difficulty and 2 drachms of light-coloured urine came away. No anæsthesia was required for the operation.

The incision was kept patent by passing a catheter three times a day for three days. The child was discharged after ten days, during which urine was passed without any trouble. Further reports are that the child is quite well.

No other developmental abnormalities were found.

This is the first case of the kind we have encountered in 25 years of hospital and private work.

My thanks are due to Lieut.-Colonel E. T. N. Taylor, I.M.S., for kindly permitting me to publish this note, also to Dr. R. Chowdhury for sending the case to us, and to Dr. S. K. Dutta and Mrs. I. Roy for helping in diagnosis and operation.

A STRANGULATED PARADUODENAL HERNIA

By M. V. RAJAPURKAR, L.M.P. (C. P.)

House Surgeon, Mayo Hospital, Nagpur

History.—On the 24th September, 1941, M., a Hindu male, aged 40, was admitted to hospital with a history of severe griping pain in the upper abdomen for two days and inability to pass fæces or flatus for the last 12 hours. No history of previous illness. He had vomited twice during the last 3 hours, and had a feeling of nausea and severe thirst.

Physical examination.—The patient was very restless and complained of severe griping pain in the abdomen, particularly in the epigastrium.

Temperature—99°F.

Pulse—110 per minute, small in volume and low in tension.

Respiration—36 per minute, mainly thoraco-abdominal.

Tongue—dry and furred.

Abdomen—there was a fullness in the upper abdomen, particularly in the epigastrium. The abdomen was soft but not tender. Auscultation of the abdomen revealed no signs of increased peristalsis.

Liver dullness—present, normal.

Hernial orifices—normal.

Rectal examination—nothing abnormal detected.

Nervous system—nothing abnormal detected.

Heart and lungs—nothing abnormal detected.

A definite conclusion could not be arrived at so it was decided to watch the patient. Meanwhile the following treatment was carried out:—

At 11 a.m.—(*a*) A high compound enema was given with poor result.

(*b*) Glucose solution 25 per cent 50 c.cm. was given intravenously.

(*c*) Morphine hydrochloride gr. ¼ and atropine sulphate gr. 1/100 was injected subcutaneously.

At 12 noon.—A high compound enema was repeated with no result.

At 12 p.m.—The patient was obviously very ill and becoming worse. The pulse was now 122, small in volume and low in tension and so the case was taken to the table with a provisional diagnosis of intestinal obstruction.

Operation.—Under chloroform anæsthesia a right paramedian incision was made and the abdomen opened in the usual way. The part of the ileum near the cæcum presented in the incision. The cæcum and the appendix were normal. On tracing the intestine upwards for about a foot it was found collapsed, which could be traced to the paraduodenal fossa. The margin of the paraduodenal fossa was stretched by a finger and the whole of the jejunum and part of the ileum was released from the strangulation. The gut was found to have twisted round itself. The gut having been released the mouth of the sac was stitched. The intestines were healthy. Flatus tube was passed on the table with good results.

Post-operative treatment.—(1) Fowler's position in bed. (2) Liquid diet. (3) Intravenous glucose 25 per cent 40 c.cm. was given twice daily for two days. (4) Pitressin 0.5 c.cm. was given every 6 hours for the first 24 hours. (5) Morphine hydrochloride gr. ¼ and atropine sulphate gr. ¼ was injected subcutaneously twice daily for two days.

The patient made an uneventful recovery. The wound healed by first intention and he was discharged cured on the 14th October, 1941.

Comment.—In view of its extreme rarity a brief account of the applied anatomy and the mechanism of formation of these herniæ is given.

A paraduodenal fossa is very rarely present, but when present it is larger than others. Its mouth looks medially and its free crescentric margin which may be 2 inches long communicates with the lateral extremities of the free borders of the superior and inferior fossa when present. The inferior mesenteric vein runs upwards in its anterior wall and the ascending branch of the left colic artery may occupy a similar position or may lie along its lateral margin. When a hernia enters this fossa it carries its sac downwards and laterally behind the posterior parietal peritoneum and the vessels already mentioned, but in front of the left ureter or kidney.

Normally it is occupied or filled by the convexity of the terminal part of the duodenum to which it serves as a bursa. The commencement of the jejunum presses into the fossa, enlarges its cavity and ultimately separates the peritoneum from its posterior attachment. It may spread in one or all three directions, to the right behind the duodenum, to the left behind the inferior mesentric vein or upwards behind the suspensory ligament and the root of the transverse mesocolon. More and more of the small intestine passes into the increasing pouch until at last the whole of the small intestine may be found lodged in an enormous median retroperitoneal sac, the mouth of which is the orifice of the fossa duodeno-jejunalis.

Interesting features of the case are :—

1. It bears testimony to Lord Moynihan's statement—'It will perhaps be found that acute intestinal obstruction is not so much due to an actual compression at the neck of the sac as to a volvulus of the bowel; all gut in the hernial sac is twisted round the entering and returning loops'.

2. In these cases there is often abdominal tenderness and rigidity owing to extravasation of blood in the peritoneum. It was an absent feature in this case.

3. Coprostasis is an indefinite sign of intestinal obstruction and should not be relied upon for diagnosis or treatment. (The patient's bowel had moved 12 hours before admission to the hospital.)

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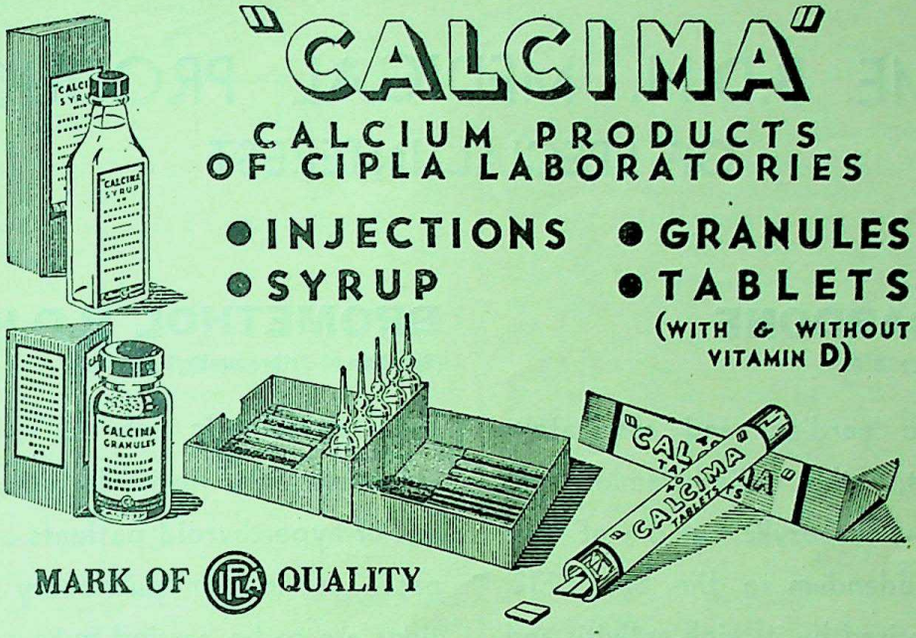

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MAY

THE LEPROSY PROBLEM

THE war has added to the many medical and social problems that have to be faced daily, and it has inevitably tended to push the old ones into the background, but most of our old problems are still with us, and, even if we are too busy to face them properly now, they will have to be faced sooner or later in the new, and we hope improved, social order that will arise after the war. We have been reminded of one such problem by the issue of the report, by a committee of the Central Advisory Board of Health, on *Leprosy and its Control in India*.

The popular conception of leprosy, in many countries in Europe at least, is that it is a most highly infectious disease which is liable to develop after a single contact with a leper, and that one rapidly becomes white all over and one's limbs periodically drop off. Traditional influences, especially that of the bible, have been responsible for this, and the medical profession has for many years attempted to dispel this altogether erroneous impression, as an important step towards the development of a more rational attitude towards leprosy on the part of the general public. The unreasonable fear of infection has in the past led to the neglect of and the infliction of unnecessary cruelties on the victims, which in turn has led to concealment.

The extreme infectiousness of leprosy was first questioned about the middle of the last century. In 1862 a committee of the Royal College of Physicians of London found no evidence that leprosy was communicable, but a majority considered it to be hereditary. A few years later, the Indian Leprosy Commission of 1890, despite the otherwise practically unanimous opinion on the infectious nature of the disease, which naturally followed the discovery of the lepra bacillus in 1872, adopted the unique view that leprosy was not hereditary, and that, though technically it was infectious, it was seldom so transmitted, but was generated *de novo* in persons living in insanitary surroundings. Since this date, however, no authoritative body has questioned the infectiousness of leprosy, but it has been clearly shown that the degree of infectiousness is very low, and that, even after continuous and close contact over a long period, transmission to an adult is often not effected; for instance, in 95 per cent of instances leprosy in a husband or wife is not transmitted to the other partner. On the other hand, children are extremely susceptible; a very large percentage of children left with leprous parents develop the disease. During recent years, the problem of hereditary transmission has been clarified; all the evidence points to the conclusion that there is no hereditary transmission, for, if children of leprous parents are removed from these parents at birth, they practically never develop leprosy.

This clarification of the question of the infectiousness of leprosy has made it possible for the general public and the medical profession to take a much more reasonable view of the leper problem, in place of the extreme panic or the extreme indifference with which it has been viewed at different times in the past. There seems to be no question that isolation, and preferably institutional isolation, of all *infectious cases* and of all cases likely to become infectious, is the best solution; the real problem is to decide how this isolation can best be done under the prevailing conditions.

To carry out a scheme of institutional isolation in India would mean institutional accommodation for a quarter of a million patients, whereas at present accommodation for only 14,000 is available. If more accommodation were available, it is believed that much of this isolation could still be achieved on a voluntary basis, except with regard to leper beggars, and here compulsion is absolutely necessary. In large towns leper beggars are a serious menace to public health; though it may be true that many of the most crippled beggars are 'burnt-out' cases and therefore not infectious, a big percentage of beggars are highly infectious. In this matter, public sentiment is much to blame. If the public could be impressed with the fact that every pice given to a leper beggar helps to keep alive an active source of infection for themselves and their children, whereas that same pice given to an institution for destitute lepers would help to remove this source of infection, they would realize that by giving way to sentiment, the alms-giver commits a double crime against society and himself.

Another line of attack—we will not say 'a second line' because many will place it first—is the early removal of infants from leper parents. Could this be done systematically and efficiently, it seems probable that leprosy would be markedly reduced within a generation or two. If unrestrained propagation were allowed in leper colonies, the problem of dealing with the children would become an even more serious one than the maintenance of the colonies themselves. This question of birth control amongst lepers is an aspect of the problem that does not seem to have been emphasized in the very comprehensive report that we referred to at the beginning of this editorial, beyond a suggestion that married life should not be allowed in institutions unless the woman has passed the child-bearing age, which is not facing the problem at all, but only rather feebly sidetracking it; however, it is obviously an aspect that will eventually have to be faced.

One of the first and most important steps in the solution of the problem of leprosy, in India, in particular, is education. Let us not delude ourselves that this is outside our scope, for where this education is most needed is in our medical schools and colleges. We believe that the

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student is no longer taught that the disease arises *sui generis* or *de novo*, but the attitude is certainly that it is *ultra vires*, as far as the general medical curriculum is concerned; if you suspect leprosy you call in a specialist or send the patient to the nearest leprosy clinic; otherwise, you do nothing about it, except avoid contact with the patient yourself. This has we are afraid too often been the advice given to the student and young practitioner. The leprosy problem is very largely a socio-economic one, but this matter of medical education is a direction in which the medical profession can help without outside assistance.

Attention is drawn in this report to the very useful leprosy courses that are being held from time to time at the Calcutta School of Tropical Medicine and elsewhere, under the auspices of the British Empire Leprosy Relief Association. These, however, should be looked upon largely as an interim measure to help to remedy an obvious defect in medical education in this country; when the teaching in these courses has filtered through to the medical schools and colleges, they will have achieved one of their main objects.

The report issued by the Central Advisory Board of Health gives a very excellent account of the leprosy problem in India, past, present and future. We propose to reprint the summary and recommendations with which this report concludes, in our next issue.

Special Articles

ALCOHOLIC BEVERAGES IN INDIA

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PART II

Consumption of country spirits and beers in different provinces

IN this section an attempt is made to review the present position of the use of different alcoholic beverages in different provinces with special reference to the conditions which determine their consumption in these areas.

1. *The Bengal Presidency.*—The consumption of country liquor in 1936-37 was 364,589 proof gallons which amounts to 73 proof gallons per thousand of the population. The name 'country spirit' in Bengal applies to unsophisticated spirit made locally from mohua and molasses. The standard strength varies from 25 degrees and 75 degrees underproof. The causes which determine the consumption of alcoholic drinks in this presidency are the comparatively small urban population, especially towards the west, the fair percentage of Mohammedans chiefly in the eastern districts, and the large industrial population extending from Calcutta to Asansol in the north-west along the railway lines and in the coalfields. From a careful survey of the consumption of spirits in different areas it has been concluded that the presidency can be divided into three district zones : (1) the town of Calcutta, its suburbs, and the adjoining industrial areas of Burdwan and Hooghly; (2) the Darjeeling district and the adjoining tea gardens; and (3) the Eastern Bengal zone comprising the Dacca division, populated mostly by Muslims (67 per cent). This area is mainly agricultural, and therefore the consumption of alcohol is, on the whole, much lower here than in the other parts of the province.

Pachwai or *handia* or *marua, i.e.,* fermented liquor brewed from rice or millet, is drunk chiefly by the aboriginal tribes in several districts and is used both as a stimulant and as a food. It is the favourite drink of the lower classes, particularly the aboriginals. Except in Darjeeling, where *pachwai* is chiefly made from millet, rice is mainly used for its production. Free home-brewing of *pachwai* is permitted only for private consumption to the aboriginal tribes in a few districts during the annual *Bandhana* and *Pous Sankranti* festivals. *Wanchu,* a variety of fermented liquor, prepared from rice, is sometimes used by the Chinese in Calcutta on ceremonial occasions for which temporary permission is obtainable.

TABLE VI

Number of licences issued for retail sale home-brewing and manufacture of *pachwai* on special occasions in Bengal Presidency:—

Retail	1,145
Home-brew	61,406
Manufacture on special occasions ..	633
TOTAL ..	63,184

The migration of the aboriginal tribes to Burdwan, Birbhum, Bankura and Murshidabad districts, which adjoin Chota Nagpur and Behar, has spread the use of *pachwai* all over this province, especially in the western and northern districts bordering the Chota Nagpur hills and the Himalayas. In the northern and eastern parts of Bengal, comprising the Darjeeling district, Sikkim and Bhutan borders, the use of a different kind of beer called *marua* is in vogue.

2. *Behar.*—The consumption of country liquor during the year 1939-40 amounted to 640,426.5 proof gallons, roughly 3 proof gallons per 1,000 of the population. Country liquor is mostly consumed in Patna division, in two districts of Bhagalpore division and in two districts

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of Chota Nagpur division. The districts of Patna and Arrah form part of a compact and well-defined alcohol-consuming area which includes the adjoining Benares and parts of Allahabad divisions and almost the whole of the Oudh in the United Provinces. The cause of the high consumption of country spirit in these areas appears to be more ethnological than occupational. In other districts of these provinces the place of country spirits has been taken by other intoxicants such as *ganja* and opium. The only exception is Manbhum district where, with the development of coal mining industry, the use of liquor has also increased. The consumption is also somewhat higher in Monghyr where the people have a racial tendency towards drink, and where high cash wages are paid to the employees in railway workshops at Jamalpur.

Pachwai or *handia* is the universal drink of the aboriginal tribes such as Sonthals and Bhils inhabiting Chota Nagpur hills which comprise the district of Ranchi, Hazaribagh and parts of Sonthal Parganas. The total number of licences issued during the year for retail sale was 445, and the total number of home-brewing licences was 2,659. These licences were issued in the districts of Champaran, Bhagalpore and Purnea. *Tari* is largely used in Gaya, Monghyr, Saran, Muzaffarpur and Darbhanga, and is obtained from coconut and other palm trees.

3. *Orissa.*—In this province the general picture of addiction to alcoholic drugs is almost identical with that of Behar. The consumption of country spirit during the year 1936-37 amounted to 109,562.2 proof gallons, roughly 17 gallons per 1,000 of the population. The highest consumption is in parts of the agency tracts in Balliguda, G. Udayagire and Khondmals in Ganjam district.

Tari is the sap of the palm tree, and is used either freshly drawn from the tree or after fermentation. The date is the only variety of palm tree from which *tari* is drawn in this province. Last year 3,054 trees were tapped.

Pachwai.—Liquor brewed from *pachwai* with the help of a fermenting agent known as *bakkar ranu* is used in certain parts of this province. The drink goes by various names—*pachwai, handia, henda, paindan* and *sooram*. This is the favourite beverage of aboriginals. The retail shops numbering 60 for *pachwai* are mostly situated in Balasore and Sambalpur districts. Besides there were 846 licences issued for home-brewing. The chief consumers are Bhuinyas, Kols, and Santals. Special licences for manufacture of *pachwai* on festive occasions are issued to these tribes.

4. *United Provinces.*—The total consumption of country spirit during 1938-39 amounted to 327,925 proof gallons which works out to 7.1 proof gallons per 1,000 of the population. The factors influencing the consumption of alcohol in the United Provinces constitute (*a*) the larger number of towns in this province compared with others, and (*b*) the low percentage (14 per cent) of Mohammedans. The actual consumption of liquor is believed to be higher than that indicated by the excise returns. This is due to the fact that a large amount of illicitly manufactured liquor is used by the cultivators—a thing it is difficult to prevent. As already pointed out, the area of highest consumption of spirits in this province adjoins Behar, areas between the Ganges and the Jamuna rivers, and in the north up to Lucknow. Most of the consumption of the country spirit is confined to the large cities and cantonments—Allahabad, Bareilly, Cawnpore, Gorakhpore, Mirzapore, Lucknow and Faizabad.

In the province both plain and spiced country spirits are used. The chief bases used for the manufacture of country spirit are *mahua* flowers and molasses. The admixture of these in varying proportions is also employed. The eastern districts prefer spirit manufactured from *mahua* or a mixture of *mahua* and molasses, but the western districts generally prefer spirit distilled from pure molasses. The Tharus of Gonda and Bahraich districts and the Bhutias of Kumaun use gram as a base for the production of spirit, while the inhabitants of certain parts of Naini Tal district manufacture *pachwai* or rice beer.

Special exemption from the excise laws and rules in certain localities.—The Bhutias are exempted, while residing within the parganas of Dharma and Johar and at the Bholia Parao at Dharchula in the pargana of Askot in the Almora district and in pargana Painkhanda in the Garhwal district of the Kumaun division, from all those provisions of the United Provinces Excise Act (IV of 1910), which prohibit the manufacture of liquor exempt under a licence and the possession of liquor in excess of retail quantities, provided that any liquor which they manufacture or possess is used for domestic consumption only and not for sale. The inhabitants of Jaunsar Bawar in the Dehra Dun district, which lies outside the town of the Kalsi and Chakrata cantonment, are exempt from the provisions of the Act, in so far as they are permitted to manufacture spirituous and fermented liquors, known as *sur* and *rabra* respectively, without any licence.

Other country fermented liquors.—Sendhi, a kindred drink to *tari*, made from the sap of the wild date palm *Phœnix sylvestris*, is also sometimes used. *Darbahra* is a variety of country beer obtained by fermentation of various herbs. This very slightly alcoholic beverage is used to a limited extent in the Azamgarh district. *Buza* is a fermented liquor made from rice and is very little used now. In the western districts of the United Provinces hemp preparations and opium are commonly used in place of country beers.

5. *The Punjab.*—The common country spirit used in the Punjab is prepared by the addition of flavours and spices to plain spirits, care being taken, for excise purposes, that the product does not resemble any foreign spirit. Plain spirits are also used and are distilled from cane sugar.

In 1939, the issues of spiced country spirit for consumption in the Punjab amounted to 317,156 gallons as against 82,758 gallons of plain spirit. The total consumption of both varieties amounted to 399,914 gallons. The consumption of spiced country spirit is encouraged because its use creates a demand for a drink which the illicit distillers are unable to supply. In the Punjab the proportion of urban population to the rural population is almost the same as in the United Provinces, with the difference that there are about 53 per cent Mohammedans in this province. Therefore the highest consumption is confined to definite areas comprising mainly the central districts of Lahore, Amritsar, Ferozepur, Jullundur, and Ludhiana, which are largely populated by Sikhs. Besides the above areas the consumption is also fairly high in the towns and cantonments of Simla, Ambala and Rawalpindi. In the northern and western districts, which are mostly populated by Mohammedans, and in the southern and eastern parts which are predominantly Hindu, the consumption of country spirit is comparatively low.

The country beers are used only in scattered areas of the Himalayas. The varieties known as *sur* and *lugri* and *chang* are the favourite drinks in the hill

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tracts of the Kangra district, and in the parts of western Himalayas extending from Kashmir in the north and to Lahoul, Spiti and Kangar. Home-brewing of these beers is allowed in certain areas under licence. No *tari* is used in this province.

6. *North-West Frontier Province.*—In this province over 90 per cent of the people are Mohammedans, who have a strong feeling against the use of alcohol, and the population is for the most part rural. The consumption of liquor, therefore, is much lower in this province than perhaps in any other part of India. The total consumption of country spirit during the year 1939-40 was 10,114 L.P. gallons, and is confined mainly to the large towns. The habit of drinking exists only amongst the working and middle classes in the towns. The present rise in consumption can be attributed to the contact with other provinces, and mainly to the large military population. No country beer or *tari* is used in this province.

7. *The Madras Presidency.—Arrack* is the name given to distilled spirit used in this presidency. In South Kanara district, spirits distilled from cashew are very popular. During the year 1938 the total consumption of country spirits amounted to 999,685 proof gallons, which works out to be 22.6 proof gallons per 1,000 of the population. In this presidency the Mohammedan population is only 6.4 per cent, and for this reason the consumption of alcohol is comparatively high. The agricultural classes consume a large amount of toddy. The Madras and Bellary cities and the cantonment areas also showed a high consumption; the other districts with a high consumption were Vizagapatam and South Arcot. Sweet toddy is used in certain agency tracts in East Godaveri, West Godaveri and part of Guntur and Nellore districts. Fermented *tari* and Malabar *arrack* (spirit distilled from *tari*) are used in South Kanara. In this presidency *tari* is drawn from the coconut, sago, palmyra or date palms and *dadasal* trees.

In most of the areas the use of fermented country beers has been replaced by *tari*. The country fermented beers, such as *londa handa* and *sonti saru*, are sometimes used by the fishermen on the coast. The grant of licences for its sale was stopped in 1897–98, because of the availability of a more wholesome fermented liquor *toddy* or *tari*. In the southern districts a drink known as *akki bhoja* is largely used, particularly in Mysore plateau in Miland. The brewing and consumption of liquors is subject to little or no control in the non-regulated tracts of the Madras Presidency.

8. *The Bombay Presidency.*—The total consumption of country spirit during the year 1937-38 amounted to 1,054,518 proof gallons. The Bombay Presidency used to consume approximately one-third of the total liquors drunk in India. The consumption in this province before the enforcement of prohibition used to be nearly five times as much as in any other province of India. With regard to the consumption of liquor it is convenient to divide the province into the following three zones :—

I. *First zone* consists of Bombay town, and its suburbs—Kolaba, Thana Surat, Khandesh and Broach districts—which form more or less a continuous tract of land. This area records the highest consumption.

II. *Second zone* comprises the towns of Ahmedabad, Nasik, Belgaon, Satara, Sholapur, Dharwar and Hubli which are all industrial centres.

III. *Third zone* comprises south coasts districts of Kanara and Ratnagiri. The backward districts of Panchmahal and Kaira also show high consumption.

The high consumption in the first zone may be due to the following factors :—

(*i*) The natural inclination of the people for drink; (*ii*) the large fluctuating population in these areas; (*iii*) the damp and unhealthy climate; (*iv*) the better economic conditions, such as high cash wages earned by the mill hands in the mill areas and by the labourers and the fishermen in the sea, and (*v*) general prosperity and high standard of living. In Khandesh practically the whole population, except Brahmins, Wanis and Guzar-kunbis, indulge in the use of liquor.

The high consumption in the towns and industrial areas is due to the large proportion of the labour population belonging to races amongst whom drinking is common, and it may also be partly due to the nature of their work which necessitates the use of stimulants.

In the south-coast areas the high consumption is attributed to the damp and unhealthy climate, the natural inclination of the inhabitants of these areas to drink, and partly also to the better economic conditions of the people.

Toddy, both fresh and fermented, is used throughout the presidency. There are three kinds of licences, *viz*, shop licences, tree-foot booth licences and licences for domestic consumption. The domestic licences are issued mostly in certain *talukas* of Surat, Panchmahal and Poona and Kaira districts. *Tari* consumption is very high in Surat, Thana and Ratnagiri districts and in the town and island of Bombay.

In Panchmahal and Kaira districts the chief consumers are Bhils and other aboriginal tribes who indulge in illicit distillation.

9. *Sindh.*—Seventy-six per cent of the population of Sindh is Mohammedan. The well-to-do Sindhis are addicted to various sorts of spiced-liquor, drinking of the plain or cheaper liquors being left for the poorer classes. There is a fairly large industrial and drinking population in the city of Karachi. The total consumption during the year 1937-38 amounted to 109,399 proof gallons. Consumption is large in the towns of Karachi, Hyderabad, Kotri, Shikarpur, Sukkur and Rori. Toddy is sold only in the towns of Karachi and its suburbs, Hyderabad, Sakhar and Dadu districts. The total consumption during the year 1937-38 amounted to 42,682 gallons. *Tari* is used in Karachi district.

10. *Central Provinces and Berar.*—The total consumption of country spirits during the year 1939 amounted to 512,757 proof gallons. The population of the Central Provinces is mostly aboriginal in the hilly districts and agricultural in the districts to the north and south of Satpura range. It is partly agricultural and partly industrial in the cotton-growing areas, such as Nagpur, Akila and Amraoti districts. These factors determine the consumption of

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liquors in these areas. The highest consumption of alcohol is recorded in Bhandara, a rich district at the foot of the hills. Chanda, Ellichpur and Mandla are largely inhabited by aboriginal tribes who consume country beers. In Chatthisgarh division, the consumption is lower in Raipore and Bilaspur, which are inhabited by Satnami Chamars. The local liquor made by simple fermentation from the sap of palm trees is also subject to taxation. The consumption of this liquor is confined almost entirely to the Nagpur, Bhandara, Chanda, Wardha, Jubbulpore, and Chhindwara districts.

Toddy.—Total consumption of *toddy* during the year 1939 amounted to 490,165 gallons; it is used all over the provinces. Tree-tapping licences are granted to Madia Gonds of Chanda district and also to certain other classes in Wardha, Akola, Saugor and Yeotmal districts, Hoshangabad, Nimar and Saugor districts.

11. *Coorg.*—The population of Coorg appears to be largely addicted to the daily use of alcohol, many of them earn daily wages. There is also a certain amount of consumption of toddy. The consumption of country spirit in 1938 amounted to 9,963.2 proof gallons with an incidence of 151.4 gallons per 1,000 of the population, the highest in India.

Toddy.—Unfermented toddy in this province is not subject to any taxation. Fermented toddy is used all over the province and there were 47 licences issued during the year 1940.

12. *Ajmer Merwara.*—The rate of consumption here is higher than in any other province except Coorg. Consumption of country spirit during the year 1938 was 61,461 proof gallons with an incidence of 103.3 gallons per 1,000 of the population. This appears to be largely due to (1) the presence of extensive railway workshops of the B. B. and C. I. Ry., and (2) on account of its being a popular place of pilgrimage.

13. *Baluchistan.*—The consumption of country spirit during the year 1938 in the Agency was 20,756.2 proof gallons, confined to Quetta and to a few other stations and villages mostly along the railway lines. The population is mostly Mohammedans who do not take alcohol.

14. *Assam.*—The consumption of country liquors amounted to 312,796 proof gallons during the year 1940. The low price of molasses, owing to the development of the sugar industry and cheapness of rice, has given impetus to illicit distillation, which is carried on mostly by the Nepalese tea garden coolies who are well versed in this art. Country spirit is used chiefly in towns. Recently the consumption has gone up on account of opium prohibition. In Assam, the consumption of beverages such as *zu*, *madh*, and *laopani* is universal and these are the main beverages of the aboriginal hill tribes. They have also been adopted by some of the lower Indian working classes, such as the tea garden coolies. Consumption of these beers is almost universal and extends along the border of the Himalayas right up to the Shan States in Burma. Little control appears to be exercised over their production in these areas. Further east, *marua* is used in Sikkim and the neighbouring hills, *zu* is the popular drink with the Nagas. Some of these tribes never drink water, but always take beers.

Tari is consumed in Goalpara, Kamrup, Nowgong and Lakhimpur districts. The consumption of *tari* affects the sale of country spirit to a certain extent during the *tari* season in these areas. The tapping of *tari* and its sale, in an unfermented state, is exempt from all excise restrictions. It is reported that this privilege is being abused in many places.

For the convenience of the indigenous population and the aboriginal tribes residing in the province, free home-brewing of *pachwai* for home consumption is allowed up to a prescribed limit, and permits, free of charge, for brewing of *pachwai* on ceremonial occasions, in excess of the prescribed limits, are issued to such persons, on request. Such permits are, however, not required by the aboriginal tribes living in the hills and Frontier tracts, provided they act up to such instructions as the Deputy Commissioner or the Political Officer concerned may issue at his discretion. The total number of such permits issued during the year 1939–40 was 303 against 159 in the preceding year. As a result of the low economic condition of the people in general, and the low earning capacity of tea garden coolies in particular, the above privileges are much abused in almost all the districts. The consumption of *pachwai* affects the sale of country spirit to a considerable extent, more particularly in the tea districts.

CAUSES AFFECTING CONSUMPTION OF ALCOHOLIC DRINKS

A. *Predisposing causes*

I. *Ethnological factors.*—The question of race is a very important factor. To quote the majority conclusions of the Research Committee appointed by the Society for the Study of Inebriety, races that have long been exposed to the action of alcohol have grown more and more temperate. For example, Greeks, Italians, people of Southern France, Spaniards, Portuguese and the Jews, who have been most exposed to the action of alcohol, have grown more temperate. The nations of Northern Europe, on the other hand, who have been comparatively less exposed to the action of alcohol, for example the British, the Scandinavians and the Russians, are more prone to drink; whereas most uncivilized races, such as the Esquimoes, the Red Indians, the aboriginal inhabitants of Australia and others who have had little or no racial experience of alcohol, are more prone to excessive drinking. Some of these races have been wiped out by the excessive use of alcoholic drinks. West Africans are an exception to this rule; they are comparatively temperate, but they consume a lot of palm wine. This rule also holds good in India. In this country the habit of drinking and drunkenness is much commoner amongst the aboriginal races, when an opportunity is offered to them, than amongst those that are more cultured. The Aryans and the white races, who introduced the use of alcohol from their original home in Central Asia, have grown more temperate, while the races such as the Sonthals, Bhils, Gonds, Nagas and other hill tribes belonging to the aboriginal stock, who have been less exposed to the use of alcohol, are more prone to excesses, when an opportunity is offered. It was observed that these races, although they are ordinarily given

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to the use of country beers, always drink to excess if they can get stronger distilled liquors. Drunkenness is always common when economic conditions allow primitive peoples to buy stronger alcoholic drinks. Fortunately, this is not often the case, their means usually not allowing them to go beyond the cheap beers.

II. *Climatic factor.*—Taking the influence of climate, and treating India as a whole, it has been observed that the consumption of fermented and weak distilled liquors generally prevails in areas of heavy rainfall, *e.g.*, in the mountainous and sub-mountainous tracts of the Himalayas, Chota Nagpur and along the Western Ghats. Weak alcoholic beverages, such as country beers, are commonly believed to be a necessity of life for dwellers in malarious tracts. In drier climates, such as those of the Punjab, Sindh and the United Provinces and parts of Bengal and Bombay Presidencies, where greater extremes of heat and cold prevail, strong spirits are more commonly used.

III. *Religious and social factors.*—Religious and caste factors also determine to a large extent the use of liquor in this country. The use of alcoholic drinks is prohibited among Mohammedans and certain classes of Hindus, such as Jains and Vaishnavities, and prohibition is strictly observed by the two last named. Generally speaking, among the upper and middle strata of society of India, drinking is uncommon except in moderation; this is especially the case among those who take to European habits and customs, such as the Mohammedans and most of the high caste Hindus. In the Tantric sect of 'Saktas', on the other hand, drinking is not only permissible but is even enjoined both for personal use and worship. A similar practice prevails among many of the most backward castes, notably on the east coast of Madras and in the forest tracts between Chota Nagpur and Godaveri. Amongst the dhobis of the Punjab and the United Provinces, an offender is required, as a caste punishment, to provide drink for the *panchayet* of the caste. This custom also prevails in certain other parts of India among the lower working classes, such as Chamars, on religious grounds. Recently there have been big demonstrations in Bombay over prohibition brought in by the Congress Government of that province and also by the Parsees, for similar reasons. The use of *pachwai* is considered necessary at religious and social festivals by Sonthals, Garros, Koch, Dhangars, Mandais, Tipperas and other aboriginal tribes. The Sonthals, especially the women, object to the use of *pachwai* that is bought from a shop.

There is a general belief amongst the hill tribes that fermented liquors are less injurious than distilled spirits. The use of these fermented liquors is not only permitted but it is encouraged by custom. On the occasions of religious worship, among many of the backward races inhabiting the Western Ghats and in the hilly tracts between Chota Nagpur and Godaveri, the use of these liquors is considered essential. Men, women, and children all indulge, there being no restriction as to caste or creed. Among the Sonthals and Bhumji tribes of Chota Nagpur, fermented liquors are considered to be indispensable at funerals, marriages and other ceremonial occasions. Mohammedans are forbidden by their religion to take alcohol, and for that reason in the Western Himalayas, where the population is predominantly Mohammedan, these liquors are not much used.

IV. *Occupation.*—This is perhaps a more important factor than caste and religion in influencing the consumption of alcoholic drinks. A departure from the pursuit of agriculture has commonly the effect of weakening the traditional restrictions against indulgence in alcohol, an effect which is enhanced by the difficulty of maintaining the old customs under the more complex town life. The conditions of employment in Indian factories and industries, such as jute, cotton, coal and mining, cause the workers to feel the need of a stimulant after the day's work is done, and the high wages enable them to satisfy this desire. The mill hands in Calcutta, Bombay and other industrial towns, such as Cawnpore, are a good example. It is for this reason that about a dozen of the large cities in India with the bulk of the industrial population consume approximately one-fourth of the total alcoholic drinks consumed in India.

There are other factors, such as the presence of a floating population at the time of certain fairs or gatherings, which lead to a heavy consumption of alcohol. We have observed that during festivals the consumption goes up by 40 to 80 per cent in certain localities.

V. *Belief in medicinal value.*—When a relative or friend is feeling 'out of sorts' or 'seedy', a man habituated to liquor often suggests a dose as a prophylactic or curative. There is a belief amongst certain sections of population in this country that the use of alcoholic beverages is a necessity as it keeps out damp and cold, and is a prophylactic against malaria, cough and colds.

VI. *As source of vitamins and digestive adjuncts.*—Beers generally are regarded as stimulating, refreshing and thirst-quenching beverages that have a definite food value. According to analysis done in our laboratory, most of them contained 1.4 gm. of sugar and 0.6 gm. albuminoids per 100 c.cm.; there is no doubt therefore regarding their food value. In fact they have the combined value of a food and a stimulant. The quantities of carbon dioxide and other substances present may even promote digestion by stimulating various digestive juices, and thus they may act as adjuncts in facilitating the digestion of other foods. They also supply quantities of salts of potassium and sodium, calcium phosphate, etc., which are among the more important of minerals required for the

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repair of the tissues after the wear and tear of hard physical exertion.

It is well known that plants of all kinds, including lower forms of vegetable growth, contain water-soluble substances which promote growth and nutrition. Brewer's yeast is a recognized source of vitamin. The crude beers which contain both moulds and yeasts should therefore form very rich sources of water-soluble vitamins belonging to the groups B_1 and B_2, and probably also vitamin C. Most of the people who habitually take country beer are very poor, and cannot always secure for themselves a varied diet containing all the principles required for proper nutrition. Our inquiries have convinced us that the majority of such tribes are subsisting on a poor, restricted and sometimes unbalanced diet of a monotonous character. It is remarkable, however, that these primitive people are particularly free from any of the deficiency diseases which have wrought havoc in some parts of the world. The beers have been shown to be rich sources of vitamins and it is not unlikely that the supply of vitamins through their agency is responsible for the absence of deficiency diseases in these communities. Yeasts, which also occur in these beers, also contain hæmatopoietic principles, and they have been used successfully in the treatment of anæmia.

VII. *As food.*—Most of the common alcoholic beverages used in India have a considerable food value. During the process of fermentation many undigestible carbohydrates are converted into more readily assimilable sugars. The nutritive value of rice beers, such as *pachwai* and *zu*, is undoubtedly substantial. The Nagas never drink milk or use milk as a food; they always drink *zu* prepared in their own homes. In the mountainous regions of India where economic conditions are poor and the natural craving for a stimulant is greater, on account of climatic conditions, the use of country beers and spirits, offered at prices commensurate with the means of the people, has been in vogue from very early times. These mild drinks are to the poor what the different varieties of expensive alcoholic liquors are to the well-to-do.

VIII. *As a euphoric.*—For the most part people resort to alcoholic drinks in order to tide over the feeling of exhaustion after a day's hard labour in the fields, in the tea gardens or during the trying winter season. *Pachwai* is used by practically all the male and female workers in the coal mine areas of Bengal and Bihar, and is usually indulged in after the day's labour is done. The work is so hard, uninteresting and monotonous that it would be difficult for them to get through it every day without their beer. The quantities taken are often moderate, just sufficient to relieve the feeling of fatigue and ensure sound sleep. The prospect of getting it is often an incentive for work.

IX. *Economic conditions.*—All circumstances which affect the prosperity of the people in general have a direct influence on the consumption of alcohol. Consumption rises in good years and falls in bad years; it falls to the minimum during famine years. The present authors observed that the consumption rises after the harvest season in the Punjab, when people have plenty to eat. Furthermore, consumption in the shops in the mill areas rises higher on pay days than on other work days.

X. *Epidemics:*—Outbreaks of epidemics, such as cholera and plague may also be accompanied by a large increase in the consumption of liquors owing to the people taking liquor, partly in the belief that it is a prophylactic and partly to overcome the fear of the disease. This tendency was clearly observed in the last great plague epidemic in the Punjab during 1902, and it has been observed in other epidemics since.

XI. *Relation to other intoxicants.*—It is of interest to discuss here the comparative consumption of other forms of intoxicants used in India along with alcohol and how their consumption affects that of liquor. An attempt has been made to compare the consumption *per annum*, in different provinces, of spirits, country beers, opium, *bhang*, *ganja*, and *charas*. The popularity of alcoholic beverages in the same area may vary from time to time according to the fluctuations in prices of different intoxicants. The people sometimes take to toddy instead of spirit when the prices of spirits are high. This is a common occurrence in South Kanara, Surat and Konkan districts in the south.

A very remarkable instance of change of stimulants, following the increase of taxation, is that of people resorting to country beers in Bombay and Madras Presidencies where the taxation in distilled spirits has been raised to a high level.

B. *Exciting causes*

Ease of access to alcoholic beverages must be considered as an important causative factor in leading to their regular use. It has been found that the drinking habit is easily picked up and is quite common amongst the aboriginal tribes and in families where some other members of the family take alcohol. The use of alcohol is universal amongst the tribes who are allowed to manufacture their own drinks or who have easy access to it.

The important precipitating or immediate causes of habitual use of alcohol are related to the previous uses of such beverages in medical treatment, to self-treatment for the relief of pain, to recourse to drugs during emotional stress. In an investigation carried out by the present authors, over 50 per cent of the habitués attributed their addiction to contact or association with other habitués, to a desire for experience, to satisfy curiosity, to obtain a thrill, or to their use during emotional distress.

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MEASUREMENT OF RADIANT ENERGY IN LIGHT THERAPY

By P. M. MEHTA, M.D., M.S., F.C.P.S.
Director, Solarium, Jamnagar

Necessity of measurements

MEASUREMENTS are necessary to the progress of any science or art; its understanding and advance greatly depend on the refinement and organization of its measuring agents. Simplicity of measuring devices is one of the important factors which make a science adaptable to practical use. In ray therapy the question of measurements presents one of its main difficulties.

This question is very much simplified in the case of chemical medications used in the current system of medicine. The drugs are visible and can be easily measured by the measure-glass and the balance, fairly accurately. The important part the measure-glass and balance play in medical practice is lost sight of, on account of their simple and common nature. But once take them away from the doctor's chest, then will their indispensability and importance become obvious.

In ray therapy this question still remains difficult and complicated, as it has to deal mostly with invisible agents which are not accurately known, whose production in uniform quality is not yet achieved and which undergo a number of changes during transmission.

Neither the sun nor the artificial sources of light can be made to produce the required radiations in isolation. They produce them along with many other kinds of radiations. So we have to measure not only the quantity but also determine the quality of radiations emitted by them. Radiations undergo so many changes during transmission that it becomes necessary to measure them at the site of absorption instead of at the site of emission to ensure accuracy.

Accurate measurement of such variable and indefinite agents is impossible to achieve until we know them perfectly, and until we have handy unerring instruments to measure them. We cannot, however, wait till then. We must make our way with whatever implements we have.

The highly technical instruments in use in research laboratories which are capable of taking very minute measurements are unsuitable for ray clinics. But there are simpler instruments which though not so fool-proof as the clinical thermometer can still be recommended for fairly accurate and reliable results. We will describe the various instruments used for measurements in ray therapy.

Qualitative measurement

Spectroscope and spectrograph.—The spectroscope and spectrograph provide perfect instruments for accurate qualitative determination. By their means their wave-lengths as well as their intensities can be determined. The wave-lengths are measured in metric units either of Angstrom or micron. The spectrograph is the most essential instrument for the study of radiations.

In the spectroscope (figure 1) there is an arrangement to receive the light for detection.

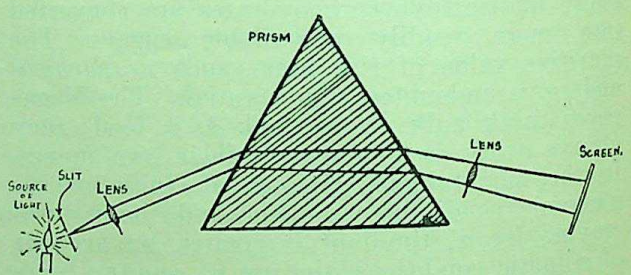

Fig. 1.—Principle of spectrographs.

It is concentrated by means of a lens on the prism where it is dispersed into its components. These are again focused on a fluorescent screen by a focusing or telescopic lens inserted between the prism and the screen. If the spectrum is to be photographed the camera should be inserted in place of the screen. This is a spectrograph.

Another device used in the spectroscope is the diffraction gratings ruled on a reflecting surface of speculum metal. Gratings ruled on a concave spherical surface will give a clear spectrum. This type of spectroscope is specially useful in the study of shorter wave-lengths (under 1,500A).

The spectroscope measures the quality of radiations present and the intensity of each wave-length. In knowing the value of any source of light the photo of spectral lines is not the complete guide, but it should be accompanied by the table or chart showing the relative intensity of each wave-length.

(*Continued from previous page*)

The persons below 30 years all attributed their addiction to contact and association with other habitués. Ten per cent of cases attributed it to the previous use of drugs in medical treatment and to self-administration for the relief of pain.

The underlying causes of habitual use of alcohol are related to the inherent constitutional make-up of the individual. Individuals with unstable nervous systems are more prone to the habitual use of alcohol and other drug habits than those with a stable constitution. This is one way of saying that those with mild psychic disorders or those with a variable proportion of mental abberation are more prone to alcoholic excess. An approach to the partial solution of narcotic drug addiction must therefore take into account the mental and hygienic factors involved. In a series, which was accessible to us for study and observation, more than one-fourth attributed their addiction to the previous use of these drugs in medical treatment or to self-treatment for the relief of pain. The others began at the instance or company of a friend or associate.

(Part III will appear in our next issue)

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Quantitative measurement

There is no direct method for quantitative measurement of radiations, so indirect methods have to be devised. The radiant energy is converted into other forms of energies which are measurable, or is made to cause chemical or biological reactions which can be measured.

The radiations to be measured are directed on the receptor which is capable of absorbing them. Liberated radiant energy is transformed into an appreciable and measurable action. As conversion takes place into various other forms of energy, it will be useful to have a table of equivalents of various energy units here.

Table of units

Name of the unit	Definition	Equivalent in other units
Angstrom ..	Unit of wave-length	$\frac{1}{10}$ mμ = $\frac{1}{10,000}$ μ = $\frac{1}{10,000,000}$ mm.
Erg	Unit for work	$\frac{1}{98,100,000}$ kilogramme meter.
Watt	Unit of electromotive force or the force sufficient to cause a current of 1 ampere to flow against a resistance of 1 ohm.	10,000,000 ergs.
Micro-watt ..	A millionth division of a watt	$\frac{1}{1,000,000}$ watts = 10 ergs.
Calorie	Unit of heat therapy. The amount of energy which could raise the temperature of 1 kilogramme of water from 0° to 1°C.	
Calorie gm. minute ..	Same heat given in one minute	697,000 ergs.
Milli. calorie gm. minute	Unit for the measure of the ABC divisions of the U-V rays.	697 ergs or 69 micro-watts.
Finsen	Unit for the measurement of U-V rays provoking erythema equivalent to the erythemal effect on 1 cm.^{2} of 6,000 ergs transported by radiation with wave-length of 2,967A.	
Abion	Bactericide power of U-V rays killing 1 million staphylococci contained in 1 cm.^{3} of water with 7 per cent sodium chloride and exposed for 100 seconds at 10 cm. distance.	

Ergs, watts, and gm. calories are the units of measurement of energy.

If the receptor is a chemical substance, the change or colour or formation of precipitate would enable us to estimate the intensity of radiations.

In biological methods, cultures of microbes or protozoa are exposed to the radiation. The killing effects on the microbes and spores are compared to the fixed standard. For erythema human skin is exposed to ultra-violet radiation. These biological reactions depend upon individual factors.

The following methods based on physical, chemical or biological reactions are in common use for the measurement of the intensity of radiations possessing those properties :—

I. *Biological reactions*

(a) *Erythema reaction on human skin (wave-length* 2,400—3,100A).—1. The Council of Physical Therapy in America has adopted this reaction as the measure of efficiency of ultra-violet generations.

2. Erythema reaction is adopted as the main guide to ascertain the sensitiveness of the patient's skin to decide the dose.

(b) *Lethal action.*—1. *Killing of protozoa.* Infusoria killing unit is fixed. The intensity of rays is measured by the time they take to kill the standard unit of infusoria culture.

2. *Germicidal power.*—In this standard culture of bacteria is used (Jausion).

This method is made use of in commercial ultra-violet sterilization.

II. *Fluorescence and phosphorescence*

These properties of certain wave-lengths are made use of to detect their presence and sometimes to measure their intensity.

III. *Thermal effects*

When any radiation is absorbed in a body, the radiant energy is converted into thermal energy in the body. If there were a perfectly black body, it would completely absorb all wave-lengths of radiations. Consequent rises in temperature of the body would give us accurately the measure of total energy of radiations. Such a perfectly black body is not yet found, but a surface coated with lamp-black or platinum-black answers the requirement for all practical purposes.

The construction of the principal measuring apparatuses, *viz,* bolometer, thermopile and micro-radiometer, is based on the transformation of radiant energy into heat. The simplest means

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for measurement of heat is the mercury thermometer. But, as mercurial changes in thermometer are affected by a number of other factors, the thermometer cannot be regarded as a very accurate means of measurement in case of radiant energy.

The thermocouple makes use of Seeback's discovery that, when two conductors with varying temperatures are joined to form a circuit, a direct continuous electric current flows in the circuit as long as the difference in temperature is maintained. In it two metals with varying conductivity are used to make a junction so that the same heat produces unequal temperature in them. The thermocouple is covered with lamp-black and platinum-black which absorb almost all radiations and convert them into heat energy. It is connected with a delicate galvanometer which registers the electric current which is in proportion to the heat produced in the metal pieces on absorption of radiations falling on them.

A thermopile consists of a number of thermocouples connected in series. The multiple junctions of thermo-elements make it an instrument of considerable accuracy for radiometric work. By careful construction its sensitivity may equal that of the bolometer and it has the advantage of being more handy than the bolometer. These instruments do not deteriorate or go out of order easily and hence they are mostly used in radiotherapy.

The bolometer measures this heat by the increased electrical resistance of strips of metal coated with platinum-black which are placed in an electric circuit. The resistance is measured by a galvanometer attached to the instrument. By a bolometer it is possible to measure difference in temperature so minute as one millionth of a degree. It is a very delicate instrument and therefore not of practical use in actinology.

In micro-radiometer the thermopile and galvanometer are combined in a single instrument. The instrument furnishes a very delicate means of measuring radiant energy.

Photo-chemical actions

Photo-chemical methods used to determine the intensity of radiations are of two types:—

1. Photographic method.
2. Other photo-chemical methods.

It is known that light causes many kinds of chemical reactions, such as oxidation, reduction, etc. Light can accelerate certain chemical reactions, and, owing to its selective action, light can cause many photo-chemical reactions in quite a specific manner.

Many types of actinometers are contrived on the basis of these properties of light to measure its intensity. Photography is the most developed method.

Changes in colour or transparency are the means of measurements in other methods. The results of these chemical methods are dependent upon a number of factors such as temperature, pressure, concentration, purity of chemicals, etc. They cannot be considered so accurate as thermal or electric methods of measurement.

Photo-electric effects

Light is converted into electric energy under certain circumstances. Every substance has a critical or threshold wave-length, that is, when radiations of shorter wave-lengths than threshold wave-length fall upon it, it begins to emit electrons. Wave-lengths below 3,000A generally produce these effects in most substances. There are some metals where these effects are produced by longer wave-lengths. The number of electrons given off is in direct proportion to the intensity of the radiations. This property is utilized to detect the presence and measure the intensity of ultra-violet radiation specially.

For practical purposes, only a few metals exhibit any appreciable useful sensitivity to light, and, since all tarnish in air, it is necessary to enclose them in a vacuum or inert gas in a glass cell. The current may be measured by ordinary instruments, such as the electrometer or electroscope or voltmeter; the current may be amplified before measurement. The instruments used are the photometer or photo-electric cell. These instruments are very delicate and deteriorate rapidly.

Photo conductivity.—In some substances the effect of light is to increase their conductivity. No new electric energy is produced but there is easier conduction of the same current. This property is specially marked in selenium. Selenium photo-electric cells are therefore used to measure the intensity of ultra-violet rays.

Instruments used in the solarium

We give below the brief description of the instruments we used in the solarium for the measurement of radiations—solar as well as those from artificial sources.

I. *Helio-actinometer* (figure 2).—The helio-actinometer for the measurement of solar radiations consists of a thermopile connected with a galvanometer. The thermopile consists of ten or nineteen junctions. The thin plates which are made of an alloy of nickel and alloy of constantan are 5 millimetres broad and 30 millimetres long. The extremities of these plates are fixed to a brass block or to the tubes forming radiators for dispensing the heat absorbed.

There is a groove in the brass block or between the tubes to receive the thermometer to measure the temperature. The latest model of 1940 has been improved so as to show the value of each junction separately also.

The area of thermopile exposed to the sun is 7 cm. by 2 cm., or 12 cm. by 2 cm. Each junction can carry one millivolt of current.

The galvanometer is also specially modified. There is direct movement of the needle and lowest possible resistance is arranged. The dial on which the needle moves shows one hundred

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divisions the total value of which is approximately 1.5 gramme-calories.

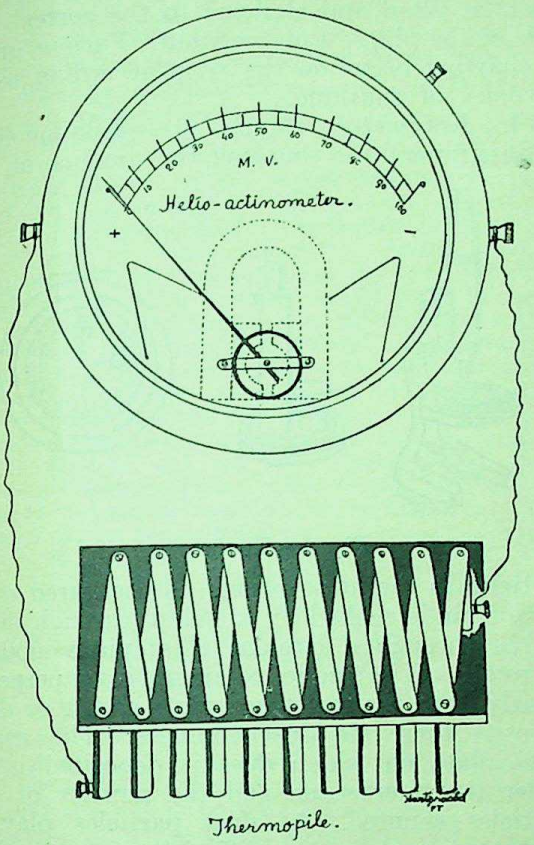

Fig. 2.—Helio-actinometer.

There are four such thermopiles used for the measurement of solar radiations:—

1. For measuring the intensity of total radiations.

2. For measuring the intensity of infra-red radiation. This thermopile is covered with a glass of selenium oxide which allows only the red and infra-red rays to fall on thermopile.

3. The pyrheliometer. The thermopile is put in a cylinder ten inches high to prevent the diffused radiation from falling on the thermopile.

4. For measuring the intensity of the ultra-violet radiations, there is no filter which allows only ultra violet to pass. Even the best ultra-violet filters are transparent to some infra-red rays. So accurate measurement of ultra violet is not possible. To obviate this difficulty a contrivance is made by connecting two thermopiles in opposite directions. The first thermopile is covered with ultra-violet filter and an infra-red filter under it; and the second one is covered with ultra-violet filter alone. The first thermopile receives only infra-red rays while the second receives infra-red and ultra-violet rays. The current produced by infra red in both will be neutralized leaving the current produced by ultra violet to be measured by the galvanometer.

To avoid frequent calculation of the time of exposure due to the variations in the intensity of solar radiations and thus to facilitate the accurate dosage, a special counter-helio-actinometer or totalizator (figure 3) is designed

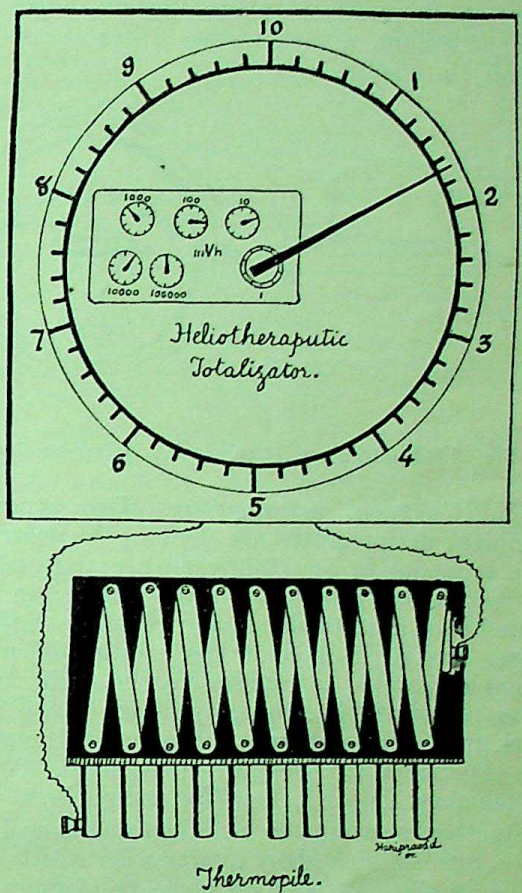

Fig. 3.—Counter-helio-actinometer.

whereby the exact intensity of solar radiation is automatically registered in solar units. This apparatus consists of a thermopile of 19 or 50 junctions to receive sufficient amount of solar energy to move a small rotator raised on a pivot and placed between the extremities of a powerful magnet. This works on the principle of electric motor. The revolutions of the motor are recorded on a dial with unit marks. The needle moves slowly or briskly according to the motion of the motor which depends on the intensity of radiation. One unit is equivalent to 2.5 gramme-calories.

II. *Spectrograph.*—There is a specially prepared spectrograph for continuously photographing the spectrum of ultra-violet constituent of sunlight.

The sunlight and diffused skylight are reflected on the slit of the spectrograph from a white plate of pure magnesium. This light is concentrated on the slit by means of a quartz lens and nickel oxide filter is inserted to remove visible radiations which would otherwise eclipse the spectrum of ultra violet. The spectrum is being continuously photographed from sunrise to sunset on a standard 35 mm., film roll turning on a rotating cylinder.

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III. *Photo-electric cell* (figure 4).—Silver selenium alloy is used to produce the photo-electric effects which are shown on a very delicate galvanometer. As visible and ultra violet both produce photo-electric effects on silver selenium, a nickel oxide filter is used to cut off the visible rays.

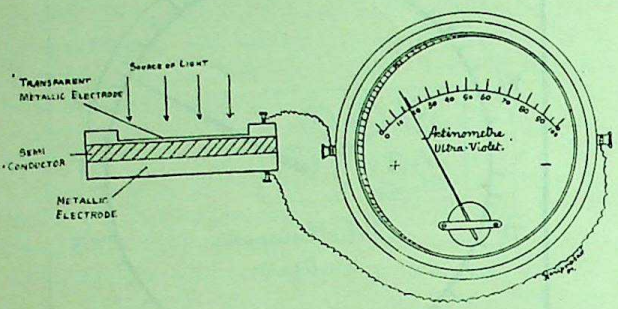

Fig. 4.—Photo-electric cell, with galvanometer.

IV. *Chemical actinometers.*—Two types of chemical actinometers are used in the solarium. One is meant to ascertain existence and amount of erythema producing wave-lengths in the emission of a particular source of light. A filter-paper soaked in a colourless solution of para-phenylendiamine is exposed to the light. The filter-paper will become greyish green and then dark grey in proportion to the quantity of erythema producing wave-lengths in the light. A disc of standard colour is kept for comparison.

Another actinometer is called the leucobase. This consists of a short quartz tube which contains an alcoholic solution of leuco-cyanure triphenylmethane which is normally colourless. The reagent takes various grades of pink colour when exposed to ultra violet shorter than 3,150A according to the intensity of radiations. A colorimeter containing ten graded discs of colour is attached to the instrument of fixing the value of colour change in the quartz tube.

V. *Sunshine recorder* (figure 5).—It is an instrument to record the intensity of bright sunshine. Sun's rays are focused by means of a glass sphere upon specially prepared and printed cardboard strips. The frame carrying the chart must be tilted and clamped to the correct latitude of the place of observation. Various grades of charring occur on the strip according to the intensity of sunshine.

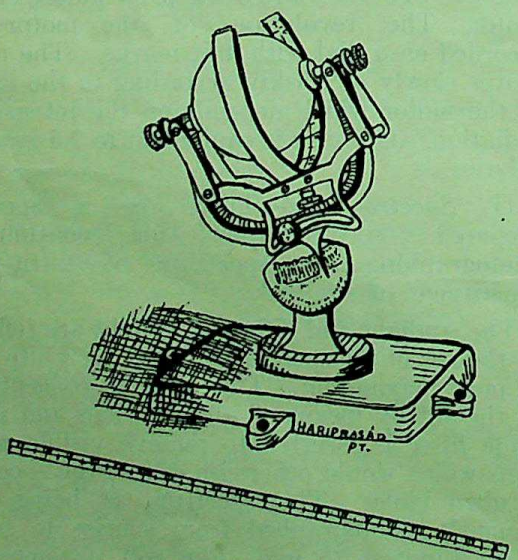

Fig. 5.—Sunshine recorder.

VI. *Konimeter* (figure 6).—Konimeter is an instrument for counting the number of dust particles in the atmosphere. A measured quantity of air is sucked by a pump through a jet passed through a circular glass plate mounted to rotate. The fine jet of air impinges perpendicularly upon the moistened plate and in so doing deposits there its dust contents. The arc of glass plate on which dust is deposited is put under the microscope and the number of dust particles counted. As dust particles play an important part in the diffusion of solar ultra-violet radiation, the counting of dust particles in the atmosphere is a useful procedure in a helio-observatory.

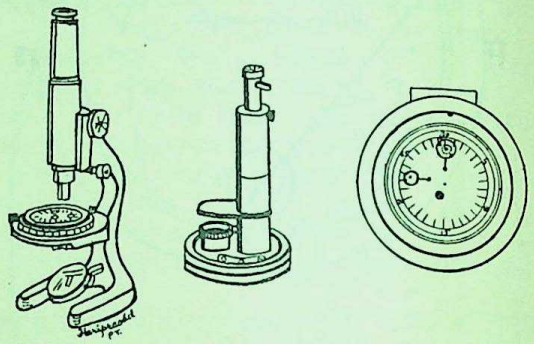

Fig. 6.—Konimeter.

Medical News

ANTE-DATE OF COMMISSIONS

THE Government of India have decided that ante-date for professional experience, assessed on the basis of half the period between the date of medical qualification and the date of appointment, should be calculated to the nearest day subject to a maximum of five years and with no minimum.

Three months ago, the Government intimated the concession of ante-date based on professional experience to emergency commissioned officers of the Indian Medical Service. The ante-date, which is limited to five years, was to be reckoned by periods of six months on the basis of half the number of completed years from the date of medical qualification to the date of appointment to the Indian Medical Service and the minimum ante-date admissible was one year, earned by two years' medical practice.

MEDICAL ASPECTS OF CIVIL DEFENCE

(INDIAN MEDICAL ASSOCIATION, BENGAL PROVINCIAL BRANCH)

Report of the Emergency Medical Service Standing Committee of the Indian Medical Association

DUE to the present international situation, it seems India is most likely going to be the next theatre of war. To avoid mistakes committed owing to unforeseen circumstances in the Far East, the following suggestions are laid down for better safety of the people of

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this province. As the State is involved in great crisis it is desirable that the Government on no account is to be embarrassed, but it should receive adequate co-operation from the members of the medical profession to render due medical aid to the public. With this view the attention of the Government and the public is drawn to the following skeleton scheme:—

1. Planning regarding dispersal of population from congested and vulnerable areas.

As the question of air-raid attacks on Bengal is at the present moment a practical possibility, the Bengal Provincial Branch of the Indian Medical Association is of the opinion that to deal properly with the air-raid civil casualties, dispersal of certain types of population from the congested and vulnerable areas to comparatively safer zones should be arranged with a well-laid plan. The people should not be simply advised to evacuate from the so-called danger zones on a voluntary basis without a definite plan regarding the medical and other arrangements for their reception in selected areas. The Government of Bengal should render proper facilities for voluntary evacuation of the school children, expectant mothers, mothers with very young children, old and infirm persons and chronic invalids. Beggars, lepers, mental cases and the like must be evacuated, on a compulsory basis for preservation of morale and establishment of confidence amongst people staying back in the vulnerable areas.

For purposes of 'planned evacuation', therefore, the province of Bengal should be divided into three groups of regions in the same lines as those issued by the Ministry of Health in England in a Schedule dated the 9th January, 1939:—

1. A limited number of large crowded areas from which evacuation is to take place.

2. A number of 'neutral' areas mainly situated in and around the towns which are not to be evacuated but are also not to be used for reception.

3. The areas considered most suitable for reception of the evacuees.

The next question that arises is that of providing the evacuees with food, protection, shelter, etc. The question of education of the evacuated children has also to be taken up by the Hon'ble Minister of Public Health who is now in charge of the 'Civil Defence' Department in collaboration with the Minister in charge of Education.

2. *Medical provisions for receptive areas.*—The evacuation of women, children, and others to safe areas has already thrown a great strain on the public health staff and the sanitary resources of many rural and urban regions. Moreover, the medical resources of most of our rural areas have already been declared both by the Government and the Indian Medical Association to be grossly inadequate for peace time. The Bengal Branch of the Indian Medical Association has already placed before the Government a comprehensive scheme for re-organization of rural medical and public health services. The Association is of the opinion that the present time is opportune for launching the scheme as an experimental measure especially in those rural areas which have become congested as a result of the dispersal of the population. The rural medical re-organization scheme will, of course, need some modifications to suit the present emergency conditions. A rural health unit with a qualified doctor, a health assistant, a trained *dai* and a servant with necessary medical and public health equipments should immediately be established in every Union Board now congested as a result of evacuation from the danger zones of Bengal and Burma. Modernized cottage hospitals with general and maternity beds and with the necessary medical equipments and personnel should also be established with the least possible delay in all affected thana centres and poorer municipal areas for medical relief and public health work there. The question of expansion of laboratory facilities and suitable arrangements regarding possible epidemic outbreaks, accommodation of infectious cases, water supply and sewage disposal, etc., are also important items in the medical provisions for the receptive areas.

3. *Medical provision for civilian defence.*—Modern techniques of warfare leading to the possibility of unheralded bombing of civilian populations make imperative the preparation of facilities for providing medical service to casualties that may result from such incident. An organization for these emergency facilities must be a fundamental part of our civilian defence programme. With the advent of the war in England, the country had been divided into *regions* which could function independently if cut off from other areas by the destruction of communications by air attacks and a similar division of medical arrangements was also carried out at the same time.

'The general aim was to provide in the danger areas for the collection, first-aid attention and sorting of casualties, and for enough treatment at the *Casualty-Clearing Hospitals* to fit them for a journey by ambulance. Next to provide *advanced base hospitals* in presumably safer areas fully equipped in both apparatus and personnel to carry out all necessary operative or other treatment of the injured; *base hospitals* still further from danger to which patients could be moved for after-treatment; and finally a group of less well-equipped *hospitals for convalescent* and chronic cases. London formed one region, but on account of its dense population and liability to attack it required special consideration. The Metropolitan Police district and the area within about forty miles was therefore divided into 10 *sectors* radiating out from the twelve big London teaching hospitals, which were to be the main casualty receiving hospitals for their sectors.'

The Bengal Provincial Branch of the Indian Medical Association has carefully gone into this question and is of the opinion that medical arrangements similar to those adopted in England should immediately be provided in the different regions of the province. The question of administrative control is also of great importance. The first-aid parties, police, civic guards, fire and demolition parties, and the question of transport, etc., should be controlled by the Home Department. The Mobile First-Aid Units, First Aid Posts, Casualty-Clearing Hospitals, Advanced Base Hospitals and Base Hospitals should be administered under the Minister of Health. The Government have already made some arrangements regarding the first-aid parties and the first-aid posts. The question of transforming the existing hospitals in and around the city of Calcutta into Casualty-Clearing Hospitals is also under consideration of the Government. The Association expects that the arrangements made should be adequate and effective without any further delay. Up till now, the Government have not apparently evolved any scheme of establishing well-equipped Advanced Base Hospitals for the operative and other treatment of civil air-raid casualties; Base Hospitals for the after-treatment and hospital for treating convalescent and chronic cases. If 8,000 beds are considered necessary for the Casualty-Clearing Hospitals, at least 16,000 beds shall have to be arranged in the Base, Advanced Base and Convalescent Hospitals in accordance with the outlines of the scheme followed in Great Britain. On 7th September, 1939, the then Prime Minister said in the House of Commons that over 200,000 hospital beds were then ready for air-raid casualties in England and Wales and plans for new hospital units were under consideration. Out of these 200,000 beds, 56,500 were in the London region, 15,500 being inside the county and 41,000 outside. He also said that 'nearly 2,500 doctors had accepted enrolment in the emergency medical service and acceptances were being received daily'.

Considering the urgency and importance of the problem, suitable steps, in transforming some of the outlying teaching hospitals (*e.g.*, in Burdwan, Jalpaiguri and Bankura) into Base Hospitals and some of the suitable subdivisional and other hospitals (*e.g.*, Midnapur, Krishnagar, Chinsura, etc.) into Advanced Base and Convalescent Hospitals, be immediately taken and necessary medical equipments and personnel be dispersed for working out the scheme.

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Medical education.—As in England, pre-clinical teaching should be stopped in the danger zones and suitable arrangements be made for their teaching in safer areas. Regarding clinical teaching in hospitals, those needing elementary clinical instruction should be despatched to the base hospitals whereas the other students be divided amongst all the other hospitals. The amount of clinical material and the opportunities for practical experience will be enormously increased in the Advanced Base and Casualty-Clearing Hospitals and this should more than compensate for the dispersal of clinical teachers.

Rôle of the Indian Medical Association.—In Great Britain, 'the British Medical Association acting on behalf of the Government established a register of all men and women who would be available, and appointed a Central Emergency Committee (later the Central Medical War Committee) to keep the register up to date. Requests for additional personnel were to be made to the Ministry through the hospital officer, and the Committee was to advise on the appointment of doctors so that they could be distributed to the best advantage. Local medical war committees were appointed to deal with problems arising in their own districts. The members of these were elected by the practitioners of each district at meetings convened by the B.M.A., but open to all, whether members of the Association or not'. The above extract (*Lancet*, 31st August, 1940, p. 279) clearly indicates the position of the B.M.A. in relation to the medical problems of the Civil Defence Scheme of the Government in the United Kingdom. The Bengal Provincial Branch of the Indian Medical Association draws the immediate attention of the Government and the public bodies to the above paragraph and requests the Government of Bengal to follow the example of the British Government in Great Britain in dealing with matters relating to their emergency medical services. The Bengal Branch of the I.M.A. will be too pleased to assist the Government of Bengal in working out the details of the medical aspects of their Civil Defence Scheme.

SCHOOL MEDICAL SERVICES IN THE PROVINCES

THE creation of school medical services in provinces and states is recommended by the joint committee appointed by the Central Advisory Board of Health and the Central Advisory Board of Education to investigate and report on the question of medical inspection of school children and the teaching of hygiene in schools.

In each major province, the committee says, there should be a whole-time chief school medical officer to administer the school medical services which should have a sufficient number of doctors for medical inspection and treatment of school children. The provincial governments should bear at least 50 per cent of the cost.

The scheme should include both primary and secondary schools and it should be a condition of recognition that each school takes part in the scheme. Medical inspection and treatment should be provided free for the children of all primary schools and of the primary departments of secondary schools. In secondary schools, particularly in urban areas, the fees charged should include a contribution towards the cost of medical inspection and treatment.

Supplementary feeding.—Probably 50 per cent of the children attending school, according to the committee, would be found to require medical attention or medical observation. It lays special emphasis on treatment and follow-up. A scheme for medical inspection without provision for treatment and follow-up, it says, is of little or no use. Schemes for treatment must include provision for supplementary feeding. All children should have a mid-day meal whether it is brought from their homes or provided at the school.

Other recommendations include the provision of school clinics particularly in urban areas, health and cleanliness parades before school starts and instruction to school children in personal hygiene.

Requisites of a teacher.—For teachers it is recommended that hygiene should be a compulsory subject in all courses for their training and practical demonstration should form an important part. Teachers should be taught by practice to recognize defects in children and to do elementary treatment.

The physical instructor of a school should have training in the elementary principles of physiology, of the hygienic mode of life and of nutrition. Health education should find a prominent place in the programme of study for physical instructors, the aim being to develop in them the incentive and the ability to train children to practise healthful living and to enable these teachers to co-operate intelligently in medical inspection.

OPENING ADDRESS BY COLONEL W. C. SPACKMAN, I.M.S., INSPECTOR-GENERAL OF CIVIL HOSPITALS, BIHAR, AT THE SCIENTIFIC SECTION OF THE FIRST BIHAR PROVINCIAL MEDICAL CONFERENCE

I FEEL it is an honour and a privilege to be asked to-day to open the Science Section of the Bihar Branch of the Indian Medical Association here in this the headquarters of the Province where so many of you began your medical careers, and to welcome so many members of our great brotherhood of service.

There are always so many problems before us as doctors, not only those of our hospitals, dispensaries, public health services, medical education and other problems of general organization but medico-social and medico-legal questions. There is also the immense and ever-widening horizon of medical research, the quest for ever new and improved drugs and methods of treatment, and investigations into the diseases and disabilities we meet with in our general and special lines of medical practice.

That this conference will be able to make much impression on this vast unploughed field I fear is unlikely, but that is no reason for not trying.

There are one or two other aspects of these medical conferences which are of importance—and I speak as one who has in my time attended many such in a number of centres—in fact, I think I can truthfully call myself an experienced congresswala. Firstly, and of no little importance to the discriminating man, I would put down that one usually gets the chance of looking at a number of new preparations and appliances put out by the ever enterprising manufacturers and dealers in medical goods. Now, I would like to issue a word of warning on this subject to the younger members, for although I have picked up many and valuable new ideas and tips for new treatment from them I have also learnt not to be led away by mushroom concerns, mountebanks and ephemeral manufacturers of claptrap. Do not listen to their seductions however plausible they may sound. Take no heed of preparations and compounds whose composition and formulæ are concealed nor of apparatus whose rationale is shrouded in mystery. Do not order them in order to experiment on your patients with them for if you do so you are debasing your calling to the level of these same medical mountebanks and swindlers and abandoning your right as members of a scientific and self-respecting profession. But if you go round with your eyes open and your critical faculties alert you can often learn a lot from the honest manufacturers, especially from the really well-known and reliable ones of long-established reputation who know that if they lend their names to a dud preparation they will forfeit the trust and respect it has taken them many years to build up.

And secondly, these meetings give one the opportunity of renewing old acquaintances and meeting old

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friends as well as of making new ones. Personally I regard this aspect as being, if not perhaps necessarily the most profitable, at least the most enjoyable feature of these reunions. Looking back I realize that I have benefited greatly by the remarkable socio-professional opportunity thus afforded and incidentally that one's own professional prestige is often partly built up by these contacts.

But alas at the present time we have before us in addition to these pleasant considerations I have just enumerated many and urgent problems—let us hope only temporary in nature—connected with civil defence against cruel and treacherous aggression. We must not bury our heads in the sand as the ostrich is said to do. However much we may wish to get on with the study of questions of the greatest professional interest and to renew purely individual contacts, we can none of us shirk our share in giving our attention and assistance to those in authority who are trying their best to organize the resources of this great country in the face of a great peril. We must not forget that in addition to our private and professional interests and obligations we have as citizens our duties and responsibilities which it should be a privilege and let us hope a pleasure to discharge.

Whilst then wishing this Conference all success in its deliberations I appeal to you all not to stand aside from your civic and patriotic obligations but to offer your willing and united help to our common cause. Individually we can perhaps do little but there is work for one and all within the civil defence scheme and it is up to our doctors, both young and old, to prove themselves worthy of our noble calling.

I find it a little difficult at the present moment to bring to the task of opening this Science Section a mind devoted purely to science in the true meaning of the word, that is the advancement of knowledge for its own sake and for the benefit of the human race. Our thoughts are distracted by the terrible suffering and destruction deliberately brought about everywhere by using all the resources of science to this fatal end, and we may well ask with H. G. Wells whether *Homo sapiens* is not bringing about his own extermination off the face of the globe because he has gained knowledge too quickly without a corresponding adjustment of outlook from that of our forefathers of old when might was right and force the only law.

It is not science that is to blame, but human nature which has failed. When science was in its infancy it was not followed for these base ends; let us look back along its path of progress for a moment, to those days which might perhaps be called the golden age of the human race when the later Stuarts were reigning in England and the Taj Mahal was newly completed in Agra in all its loveliness.

The Royal Society came into existence in those years and King Charles the Second was one of its most enthusiastic founders; Isaac Newton was explaining the mechanism of the universe on a rational and modern basis. Intelligent people were being stirred and thrilled by new suggestions and new discoveries; they stood amazed in dawning consciousness of the wonder of it all. Science was the new baby to be made much of and fussed over, the centre of great interest, but the elder members of the intellectual family—music, art and literature—were not neglected, in fact we might say that that was the age when the giants lived, the giants of intellectual achievements never since excelled in stature.

In the nineteenth century great advances were made in pure science and in the scientific basis of medicine, and especially in science as applied to manufactures and transport. Even later we find the pioneers of aviation, Orville and Wilber Wright, Bleriot, Cody, Paulhan, Graham White and a host of others, all within my own memory, and all animated by a spirit of adventure and endurance without thought of the terrible uses to which their achievements would be put in later days, indeed so very soon after.

What a sorry picture meets our eye to-day, we who call ourselves the humble followers of the great pioneers of science, but trained in their traditions of service and healing. We see all the energies of almost the whole world bent on devising and producing in maximum numbers every possible engine and agent for destroying or weakening the opposing hosts. Science has gone ahead but ideals have clashed. Man has not learnt to use these great discoveries for the good of his fellows but only for their destruction. So long as we cannot agree among ourselves as to how the world should be run we can only think of battering at each other whilst our whole civilization sinks to annihilation and extinction.

But let us turn from this gloomy picture of the present, only a few pages back to brighter days of personal memory. It seems but yesterday, though in fact it is 3 years ago, that I set out on a scientific tour of western Europe, the last of a series of similar very delightful tours. I found in Holland, in Belgium, in France, in Switzerland and Italy as well of course as in British research laboratories busily working on medical problems, well endowed and full of enthusiasm; hospitals and laboratories filled with doctors and scientists, men and women, whose whole attention and energy was concentrated on the pressing problems of endocrinology, nutrition, cancer research, all the workers eager to make headway for the relief of suffering and the stamping out of disease; all united in this common purpose.

To wrest from nature the secrets which have perplexed philosophers in all ages, to trace to their sources the causes of disease, to correlate the vast stores of knowledge that they may be quickly available for the prevention and cure of disease—these are our ambitions, declares Osler in one of his noblest addresses, and in these apt words he gives us the life-history of that splendid corps of scientific investigators to whom the world stands debtor to-day. William Harvey, the man who avowed himself the partisan of truth alone, diligently tracing out the circulation of the blood; old Anthony Leeuwenhoek, the Dutch draper, laboriously grinding out the first lenses which revealed the existence of micro-organisms, and paving the way for the brilliant achievements of a Louis Pasteur in France, a Joseph Lister in Britain, a Robert Koch in Germany, Humphry Davy and Horace Wells, Morton, Jackson and the great-hearted James Simpson, all sharing in the discovery of anæsthetics, those God-given drugs which enable the surgeon of to-day, in Weir Mitchell's immortal phrase 'with God-like will to decree the death of pain'; Laveran finding the malarial parasite, and Manson and Ross and Grassi, with infinite labour completing the whole story of malarial infection and its control; Castellani and Sambon performing the same service in the case of trypanosomiasis; Carroll and Lazear, Reed and Gorgas, ridding the world of its fear of yellow fever, as Jenner had rid it of the peril of smallpox; Roentgen and the other pioneers of radiography, their lives and limbs imperilled by the dangers of their work as their days were shadowed so often by controversy and persecution; James Mackenzie, working in humble obscurity for 20 long years at those laborious researches which have revolutionized our appreciation of cardiac disease; Ehrlich, that great plodding genius, adding experiment to experiment until he presents humanity with a means for destroying pathogenic spirochætes; Domagk and hundreds of others following him introducing the new chemotherapy of the sulphonamides, certainly the greatest advance practical medicine has made in the last 30 years, perhaps its greatest in all the history of therapeutics, for are there not an almost unlimited number of chemical variants in this group? Fresh and more potent ones are being discovered and introduced every few months; the edge of this magnificent problem has but been touched but so brilliant are the results and so bright the promise that hopes are even now keyed up to the highest pitch of expectancy. If it were not for the war we might hope to find in the near future compounds in this series capable of successful application to all diseases of bacterial origin.

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So we might continue, for the tale is not half told of the men and women whom the profession loves to honour; and yet the past teaches us that though wars and disasters and destruction spread their ravages till it appears that nothing worth saving remains, after it is all over it is found that in isolated corners and under conditions of the utmost difficulty, hardship and danger, the silent workers like faithful priests have been devotedly keeping alive the sacred flames upon the altars of science so that one day they may burn forth brightly again in the sight of all men for the healing of our grievous wounds and pitiable sores.

THE FACULTY OF TROPICAL MEDICINE AND HYGIENE, BENGAL

THE following students are declared to have passed the D.T.M. Examination, session 1941–42.

Passed with distinction

1. Omkar Nath, M.B., B.S. (Punjab), private practitioner—Awarded the 'Chuni Lal Bose' Gold Medal 1942.

Passed

(Arranged in alphabetical order)

1. Brijpal Saran Agarwal, M.B. (Calcutta), private practitioner.
2. Machiandra Aiama, L.M. & S. (Hyderabad), Medical Service, H. E. H. the Nizam's Government, Hyderabad.
3. Balbir Chand, M.B., B.S. (Punjab), private practitioner.
4. Amiya Kumar Banerjea, L.M.F. (Bengal), medical officer, Mujuai Tea Estate, Jalpaiguri.
5. Saroj Kumar Banerjea, M.B. (Calcutta), private practitioner.
6. Kedar Nath Basker, M.B., B.S. (Punjab), private practitioner.
7. Ajit Parshad Bhalla, L.C.P. & S. (Bombay), L.T.M. (Calcutta), sub-assistant health officer, district board, Jullundur.
8. Mahendra Jivanram Bhatt, M.B., B.S. (Bombay), private practitioner.
9. Benoy Bhusan Bhattacharjee, M.B. (Calcutta), medical officer, Duars Union Tea Co., Ltd., Jalpaiguri.
10. (Miss) Soonamai Nadirshaw Bulsara, M.B., B.S. (Bombay), Training Reserve Women's Medical Service, India.
11. Shib Nath Chakrabarti, L.M.F. (Bengal), private practitioner.
12. Ramesh Chandra Chakravartty, M.B. (Calcutta), private practitioner.
13. Bhola Nath Chatterjee, M.B., B.S. (Lucknow), private practitioner.
14. Narayan Chandra Chatterjee, L.M.F. (Bengal), private practitioner.
15. Sibabrata Chatterjee, M.B. (Calcutta), private practitioner.
16. Subodh Chandra Chatterji, M.B. (Calcutta), private practitioner.
17. Nand Kumar Chowdhury, M.B., B.S. (Bihar), private practitioner.
18. Abhaya Charan Das, L.M.P., L.T.M. (Bengal), sub-assistant surgeon, Government of Assam.
19. Nripendra Nath Das, L.M.F. (Bengal), assistant medical officer, Dunlop Rubber Co., Sahaganj.
20. Prafulla Ranjan Das Gupta, L.M.P. (Burma), L.T.M. (Bengal), private practitioner.
21. Kanai Lal De, L.M.F., L.T.M. (Bengal), private practitioner.
22. Sambhu Nath De, M.B. (Calcutta), private practitioner.
23. Chandrakant Tribhovan Rai Desai, M.B., B.S. (Bombay), private practitioner.
24. (Mrs.) Irene Lyall, M.B., B.S. (Punjab), assistant to the Professor of Medicine, Lady Hardinge College, New Delhi.
25. Jaiwant Vithalrao Gaikwad, M.B., B.S. (Bombay), assistant Palace Physician, Gwalior Durbar.
26. Manic Chand Ganguli, L.M.F. (Bengal), honorary assistant clinical pathologist, Calcutta Medical School Hospital, Calcutta.
27. Hari Sadhan Ghose, M.B. (Calcutta), private practitioner.
28. Jogendra Mohon Ghosh, L.M.F. (Bengal), assistant medical officer, New Puroupbari Tea Estate, Assam.
29. Lalit Mohan Ghosh, M.B. (Calcutta), private practitioner.
30. Hira Lal Gupta, M.B., B.S. (Punjab), private practitioner.
31. Shanker Govindrao Joshi, M.B., B.S. (Bombay), private practitioner.
32. Kantesh Prasad Ram, M.B., B.S. (Bihar), private practitioner.
33. Gopi Krishna Khan, M.B. (Calcutta), private practitioner.
34. Baburao Narayan Kolekar, M.B., B.S. (Bombay), superintendent of dispensaries, Gird Circle, Gwalior.
35. Amar Nath Malhotra, M.B., B.S. (Punjab), private practitioner.
36. Triloki Nath Mathur, M.B., B.S. (Punjab), private practitioner.
37. Madhab Prasad Mitra, L.M.F. (Bengal), assistant medical officer, Ganges Manufacturing Co., Ltd., Bansberia.
38. Mohamed Amin, M.B., B.S. (Bombay), private practitioner.
39. Md. Lutfar Rahman, M.B. (Bengal), assistant surgeon, Government of Bengal.
40. Sunil Kanta Nandy, M.B. (Calcutta), private practitioner.
41. Brij Mohan Nath, L.M.P. (Central Province), L.T.M. (Calcutta), private practitioner.
42. (Miss) Paranjothy, Doddana Goud, M.B., B.S., D.G.O. (Madras), lady doctor in-charge, Mission Hospital, Azamgarh, U. P.
43. Dayanand Purshottam Patel, M.B., B.S. (Bombay), private practitioner.
44. (Miss) Evelyn Peters, M.B., B.S. (Punjab), private practitioner.
45. Nadimpalli Satyanarayana Raju, L.M.P., L.T.M. (Bengal), rural medical officer, Ambajipeta.
46. Gurbakhash Singh Sardar, M.B., B.S. (Bombay), medical officer, Nabha State.
47. Santosh Kumar Sen, M.B. (Calcutta), private practitioner.
48. Pinaky Prasad Sharma, M.B. (Calcutta), medical officer, Bir Hospital, Katmandu, Nepal.
49. Hasmukhlal Lilabhai Sheth, M.B., B.S. (Bombay), private practitioner.
50. (Miss) Mahendra Kumari Singh, L.M.F. (Bengal), resident medical officer, Matree Seva Sadan, Calcutta.
51. Shiva Shankar Sahay Srivastava, L.M.F. (Orissa), 3rd medical officer, Ranchi Sadar Hospital, Ranchi.
52. Ladli Prasad Tandon, L.S.M.F. (United Provinces), private practitioner.
53. Margaret Tason, L.S.M.F. (Punjab), L.T.M. (Bengal), private practitioner.
54. Vishwanath Anant Vanikar, M.B., B.S. (Bombay), private practitioner.
55. Harendra Keshore Verma, M.B., B.S. (Bihar), private practitioner.
56. Dhanvant Gajanan Vyas, M.B., B.S. (Bombay), private practitioner.
57. Swaroop Nath Wanchoo, M.B., B.S. (Punjab), private practitioner.

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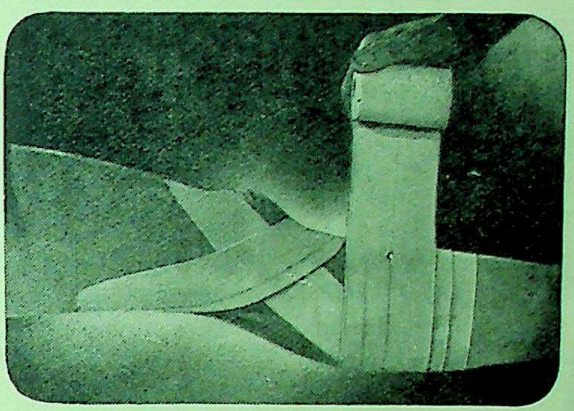
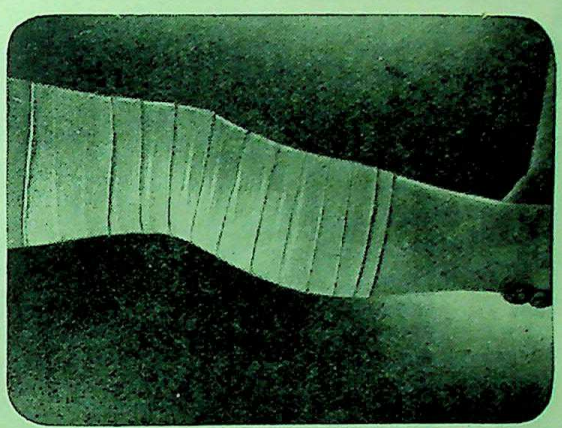
E B. 7.

'Elastoplast' in the treatment of Fractured Patella

On the 1st February, a postman, aged 30, slipped on ice and injured his knee. A radiograph revealed a transverse fracture of the patella without separation.





Treatment

2nd February.

The knee joint was aspirated and an 'Elastoplast' bandage applied in three pieces—

(*a*) inverted 'U' above patella;

(*b*) upright 'U' below patella;

(*c*) circular turns from middle of calf to 6 in. above knee.

3rd February.

The patient was able to walk with comfort.

17th February.

The 'Elastoplast' bandage had become loose, and was re-applied.

23rd March.

The 'Elastoplast' bandage was removed, and the patient given exercises to restore full power to the quadriceps.

30th March.

Full painless movement of the knee. Patient discharged.

☆ *The details given are of an actual case. The illustrations are made from photographs taken of this case.*

In the belief that such authentic records may be of general interest, the manufacturers of 'Elastoplast' are publishing these instances typical of the many in which their products have been used with outstanding success.

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Public Health Section

PUBLIC HEALTH ORGANIZATION*

I. INTRODUCTION

By W. P. JACOCKS, M.D., DR.P.H.

Regional Director for India and Ceylon, International Health Division of the Rockefeller Foundation

TWENTY YEARS ago curative medicine and public health practice were widely separated subjects. The gap between the two was so broad that serious minded people were troubled by the thought that the breach might remain permanent. To-day in many health administrations curative medicine and public health practice are so intermingled that it is difficult to distinguish the one from the other. This backward swing of the pendulum may be no more permanent than its previous forwarded excursion and it is reasonable to conclude that the pendulum will come to rest permanently between the two extremes.

The present trend of unduly stressing treatment is the easiest way to obtain the interest of the people since they know nothing else about medicine, but it is inadequate; it is also unfair to the people themselves since it requires that they must become ill in order to receive health attention. Furthermore treatment has been given by practitioners from time immemorial yet none of present-day communicable diseases have ever been controlled by this method; and it was only when public health practices were introduced that progress in control of these diseases was observed.

It is admitted that the sick should be relieved. No medically trained person would discourage care for those who are ill and there are numerous medical facilities to deal with them. But such conveniences are insufficient for the needs of the whole people since they give service only to a small part of the population. If treatment is to be the prime procedure it seems that the greatest attention will be given to the state's liabilities (those who are ill) to the disadvantage of the state's assets (those who are well).

There is a wider viewpoint. To say that the average population of any country is too ignorant to co-operate in health measures is to admit an unwillingness on the part of the department to undertake a difficult task. It is now well known and has been repeatedly demonstrated in rural areas in many parts of the world, that if serious and adequate attention is given to the control of communicable diseases, to general sanitation in its widest sense, to the physiology of pregnancy, to growing children, to nutrition and to personal hygiene that the vast majority of the village people will co-operate willingly and adequately.

There are many types of health organizations in India. The usual provincial public health organization in India consists of one Director of Health and one or more Assistant Directors. In three provinces and one state the organizations, both central and local, are developed by the provincial governments which control and co-ordinate the activities of its officers. This sound arrangement is in accord with the modern conception of public health practice. On the other hand, most of the provinces have a Director and a few Assistant Directors, whose chief duties are to inspect and advise. With few exceptions the rest of the health staff (medical officers of health, sanitary inspectors, health visitors, midwives) are non-official, that is they are employed by local bodies and are responsible to the local bodies who have no public health knowledge or experience and frequently no interest. No comment is necessary in regard to the danger of this situation. If local bodies are allowed to feel competent in directing health procedures the value of modern medical colleges and public health institutes must be reconsidered.

Health services are recognized as being of two classes, curative and preventive. Curative work has been in existence since the early days of the East India Company and at present well established and efficient organizations for treatment are found in all parts of India. Preventive work was recognized as a necessity about seventy years ago when Sanitary Commissioners were appointed to the Central Government and later to the Provincial Governments. The name was changed subsequently in the Provinces to Directors of Public Health and these officers have considerable independent authority. The present trend seems to be towards placing health work under the direction of medical practitioners who may have public health qualifications but whose experience in public health practice is limited or lacking. It would be unfortunate if this backward step should be taken.

It is considered to be administratively sound for curative medicine and public health to be under a single leadership provided the direction rests in a medical officer who has been especially trained and experienced in public health. By reason of his duties the general practitioner, the surgeon or other medical specialist cannot come into contact with the general population. It is unusual for him to know what is happening to the people as a whole in regard to communicable

*We have invited contributions from a number of officers with special experience in different branches of public health service; we hope to publish these contributions from time to time in this section.

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diseases, since he is accustomed to see only those who are ill and who seek his professional attention.

An officer qualified to carry on general public health work must have a good working knowledge of medicine and of all public health measures but he is no more qualified in the certain phases of public health work than the general practitioner is in ophthalmology. For this reason he needs assistants who have given special attention to particular subjects. The object of this paper is to describe a public health organization which is in common use in many modern public health departments and which is based on the curricula of public health institutes throughout the world.

Like all well-run businesses public health work falls into several well-known categories. For a long time it has been thought that a public health organization could function satisfactorily if at headquarters there were officers especially trained in four subjects : vital statistics, epidemiology, public health laboratory, and sanitary engineering. A diagram of this organization is appended and a brief statement is made concerning each division in the hope that this outline may be of aid to public health administrators in India.

Vital statistics.—This division keeps a record of populations, births, deaths and sicknesses. Many good reasons make it necessary for every person to have an official record of the time and place of birth. Death records are essential in respect to numbers and causes. The number of deaths gives data for calculating rates. The causes of deaths bring invaluable information. The relationship between births and deaths must be known in order to understand whether the general population is increasing or decreasing. In brief, vital statistics is the book-keeping of public health and unless the books are well and accurately kept the condition of the business will not be known.

Epidemiology.—This subject is sometimes given the heading 'Communicable Diseases'. The obvious thought is that this division will take care of epidemics caused by communicable diseases. This is only one of its duties. Were one to consider this phase alone he would think of this division as he does of a fire department which waits to respond to calls when fires occur. The real object of this department is to study epidemic diseases and learn something of their origin, their mode of spread, their occurrence in regular cycles, the population likely to be attacked, the geographical point from which the attack might come; in short, by a careful study of figures and events collected over a number of years, to have full knowledge of all epidemic diseases which are likely to occur in his particular territory. To illustrate : Suppose plague occurred in a neighbouring state. If the epidemiologist is alert, he will have this information early; he knows that plague follows grain routes; he knows that he must place his staff at strategic frontier points to examine grain and if necessary see that it is cleared of infected fleas and rats before entering his state. In this way the danger of an epidemic will be halted at the frontier. But if the old system is followed the department would wait till the epidemic appeared and like a fire department would rush to extinguish the danger. The fire department eventually succeeds but at the expense of sickness and deaths and an enormous financial outlay. This department will look after all communicable diseases.

Public health laboratory.—This division undertakes all laboratory diagnostic work for the department and gives specific answers in respect to enteric fever, cholera, plague, malaria, filariasis, rabies and other communicable diseases. It verifies or refutes the clinical diagnosis made in the field. It supplements the work of the epidemiology division and works in conjunction with it. In addition it prepares vaccines against smallpox, typhoid, plague, cholera, as well as various sera. It carries on research. It examines the water supplies and determines the pollution of well water and springs. It is the division which is able to supply an exact answer to many public health questions.

Public health engineering.—This division has become of greater importance in recent years. The old idea that the sanitary engineer dealt only with water and sewage disposal is being abandoned, and malaria engineering, town planning, housing, ventilation, preparation of models for markets and slaughter houses are some of his additional duties. He is also responsible for general sanitation which includes inspection of markets, lodging houses and other duties performed by the sanitary inspector. For this reason a sanitary engineer to-day should be more than an engineer; he should have general knowledge of public health. Vaughan (1941), Commissioner of Health, Detroit, writes as follows :—

'Let us examine for a moment the character of this public health engineer who biologically is a variant of the sanitary engineer rather than the lay inspector. He should have received his basic training in the engineering and biological sciences. Our public health engineer should expose himself to the broad aspects of public health work taught at university level so that he may become conversant with the other technical fields which border closely upon his chosen avocation. The engineer should be conversant with the principles of biology and physiology. Architects will want advice on questions of housing, new building construction and old building remodelling, expressed in terms of air space, light, and heat to assure adequate ventilation comfort, and freedom from unwanted hindrances to the development and maintenance of positive health. Mechanical engineers will

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seek advice in laying out plans for industrial plants, hotels and public buildings, so as to avoid the dangerous connections between polluted and safe waters, drains, and plumbing lines.

Food and milk inspection demand technical supervision, especially in designing and maintaining milk pasteurization plants void of mechanical imperfections, which engender false security and give the public an unwarranted sense of safety and freedom from milk-borne infection. Rodent and insect control require supervision by the public health engineer to ward off the encroachment of plague, typhus, epidemic, jaundice, and malaria, and to add to the general comfort and wholesomeness of urban life. Industrial hygiene is replete with tasks for our engineer, being a speciality with a physiologic basis abounding with engineering expression.'

These statements by Dr. Vaughan refer particularly to a city public health engineer. They are of equal and perhaps greater importance to the provincial public health engineer.

It has already been stated that these four divisions furnish the basis of a public health organization. If they are well and properly developed the public health department will be a going concern and will meet most of the needs of any province or state in India. In many countries, including India, other trained personnel are required to deal with problems which one of the four departments would normally handle but which on account of their conspicuous importance require the full-time services of a particular officer. A few of these problems are, malaria, maternal and child health, rural health work, tuberculosis, nutrition, industrial hygiene and medical inspection of schools. It is probable that all except the first three subjects can be taken care of by the staff organization already described.

Malaria.—It has been stated that malaria causes 1,000,000 deaths in India each year. This is probably a conservative estimate. Malaria is generally distributed throughout India and it is a serious problem in parts of every province in this country. In malaria it is dangerous to generalize in regard to the methods of attack. The conditions under which malaria occurs vary widely owing to the difference in the physical conditions of terrain, to climate, to agricultural methods, to the vectors concerned and to many other factors. In view of the importance of malaria in causing ill-health it would be unwise for any public health department in any province in India not to have a malaria division directed by a well-trained and experienced officer. It is fortunate that there are good facilities in India for training such officers.

Maternal and child health.—The infant and maternal death rates are so high that special attention should be directed to them. A medical officer of health trained in obstetrics and pædiatrics and supported by competent public health nurses and midwives will be required to direct this division and to prepare a plan of work including home visiting and clinics. This activity is an essential part of the official public health department and should be carried out by that organization.

Rural health work.—A better method than the ordinary district work should be evolved. The health unit offered possibilities and nothing has yet been suggested which is superior to this type of work. It has limitations which are largely due to the lack of suitably trained staff. It is not now recommended nor has it ever been recommended that the entire rural area of any province should be organized on health unit lines. But at least one organization should be established in each province, to be used as a training field for the public health staff and as a field laboratory for studying, testing and developing methods of procedure before applying them to the whole province or state.

Each of the divisions herein mentioned have been discussed only briefly, but each division is important and its activities could be elaborated into a full-sized paper.

The point which is always raised in regard to any public health organization is that it costs a lot of money. This is admitted. It is true that every worth-while activity costs money. Hospitals are expensive to erect and maintain; education calls for a big outlay; public works need large sums, but if the Government is interested the money will be found. If appropriations are indicators of interest it would be correct to state that many Governments in India even at this late day do not manifest much concern regarding public health or even agree that an investment in public health is a sound investment. Benjamin Franklin is said to be responsible for the old maxim : 'An ounce of prevention is worth a pound of cure'. Mathematical realists will at once conclude that it is sixteen times more costly to cure an established disease than to prevent its occurrence. Leaving proportional costs aside it is well known that viewed over a long period the practice of prevention is not only cheaper but far more satisfactory to the state and the people. This will be seen in a review of the costs of epidemics of plague and cholera and smallpox as compared with the financial and other satisfactions which have resulted in those areas where these diseases have been prevented. The value of prevention in respect to school health work could be cited. If properly carried out, the public health procedures in school health work will provide assurance that at the end of their education the student will find themselves physically and mentally sound. As a result they will constitute a healthy population which will be able to carry on the daily tasks more effectively to the benefit of themselves and hence to the country. Such

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prospects, which are now uncommon, are worth large investments.

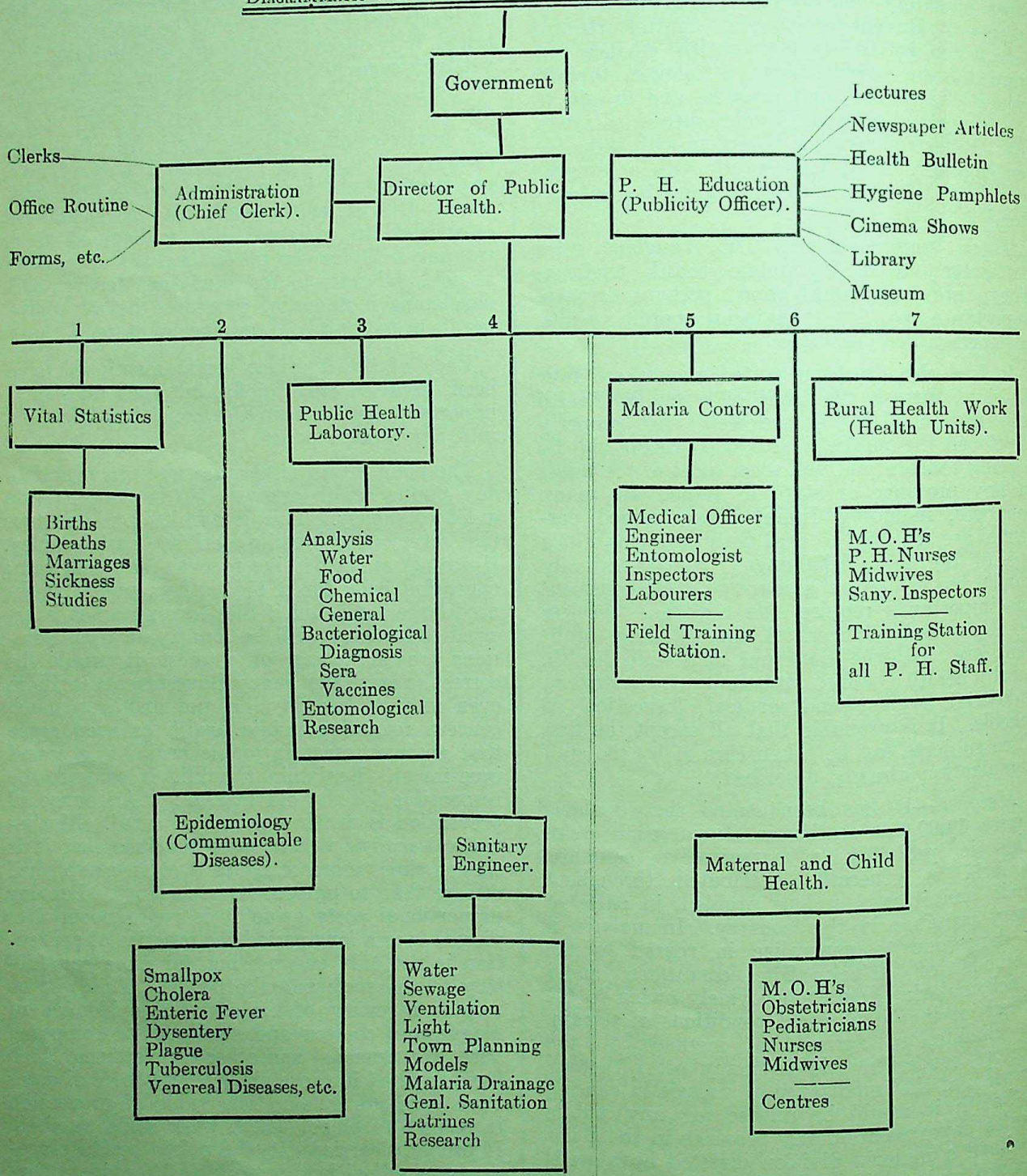
Summary

A brief discussion is given in respect to modern public health trends particularly towards treatment. A type of public health organization, based on a chart, is described.

REFERENCE

VAUGHAN, H. F. (1941). *Amer. J. Pub. Health*, 31, 431.

DIAGRAMMATIC SCHEME OF A PUBLIC HEALTH ORGANIZATION



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Current Topics

A Survey of War Surgery

By L. R. BROSTER, D.M., M.Ch., F.R.C.S.

(From the *British Medical Journal*, Vol. II, 23rd August, 1941, p. 273)

THE principles of surgery are continually being enriched by new methods which stand the test of time, but in wartime fresh problems are imposed with such insistence as to demand immediate attention, and often hasty improvization. It has been delightful to see the enthusiastic reception which has greeted the presentation of our difficulties and the genuine desire to get to work on their solution which has been displayed by the profession both in the United States of America and in Canada. At the outset it may be said that the surgical principles laid down as a result of the last war have stood the test of time, and have remained the sheet-anchor of present procedures; but before surgery can be established on a satisfactory basis it is necessary to consider some of the points in its organization.

MEDICAL ORGANIZATION

The medical organization for this war has been devised on lines different from those of the last. The policy adopted has been the formation of the Emergency Medical Service for the whole country under the Ministry of Health. Hospitals have been decentralized and re-created as sector hospitals in the countryside, and are responsible for the treatment of sick and wounded, both civil and military, although the existing Service hospitals have carried on as usual. Many of these outlying hospitals have been converted into 'special hospitals', such as centres for head injuries, chest injuries, plastic surgery, and orthopædic surgery. Before the war actually started the medical profession had been voluntarily conscripted. This work was undertaken by the British Medical Association. Every member was card-indexed and his wishes for service consulted, with the result that the Central Medical War Committee is able to satisfy from this pool any demand by the State in the way of personnel in any direction. The staffs of the voluntary and larger city hospitals have been used in manning the outlying sector hospitals. Apart from the inconveniences and the dislocation caused by the migration of large numbers of town folk to the countryside, the health of the population, in spite of rationing and overcrowding in shelters, has remained very good, and we have been free from epidemics. One of the anomalies has been that the health of the children who have remained at home has been better than that of those who have been evacuated. Although such a system has its limitations, as a wartime measure which has now become established it is running fairly smoothly and efficiently.

WAR WOUNDS

Early and free surgical excision still remains the basic, and most satisfactory, procedure in the treatment of all war wounds, and although the open Carrel-Dakin method is occasionally employed, the most important change has been the adoption of the closed-plaster method of Winnett Orr and Trueta and the use of drugs of the sulphonamide group for combating infection. The consensus of surgical opinion is that the combination of excision, closed plaster, and sulphonamides has proved a great advance in the treatment of war wounds.

Where this method has been used, as at Dunkirk, the wounded have arrived back in good condition and the wounds have been clean. It gives the maximum of comfort and eliminates many of the difficulties of transport. Morale is high, and there is practically none of that distressing condition of 'shell-shock' which was so prevalent among the wounded from the trenches during the last war. There is no doubt that the closed-plaster method is a boon to the patient; it gives comfort and rest, and eliminates the dread of the painful daily dressings of the open method. Its greatest objection is the obnoxious smell. However, it requires constant supervision, for on the appearance of a raised pulse or temperature, pain, sleeplessness, loss of appetite, œdema, or coldness of the toes, the plaster should be removed. Where this close observation has not been possible some cases have arrived with spreading infection, sometimes anærobic, and gangrene beneath the plaster. Under such conditions some surgeons prefer to transport their patients with a peeping window cut in the plaster over the wound, or, if the distances are short, to dispense with it altogether—as in such cases as fractures of the lower limb, in which the Thomas splint with traction has again proved its value.

With regard to sulphonamides, these can be employed in two ways—prophylactically, or locally into the wounds: by mouth, starting with 2 grammes followed by 1 gramme four-hourly up to a total of 20 grammes, or by direct insufflation into the wound in doses varying from 5 to 20 grammes. Experience has confirmed that more satisfactory results are obtained with local application. The chief aim is to get the wounded to the nearest surgical unit within twelve hours, and in these days of mechanized and aerial transport this ideal should be increasingly realized. In hospital the primary considerations are the arrest of hæmorrhage and the treatment of shock, whether primary or secondary. It is only then that excision should be carried out. This requires the removal, not too wide, of skin, all devitalized muscle and fascia, and detached fragments of bone and foreign material, so as to obtain a saucer-like wound, which is the most satisfactory for drainage. The more urgent call for early excision is in wounds of entry into fleshy parts with retained missile. In multiple wounds the larger ones only need be excised, as also those wounds complicated by fractures or involvement of joints. Although primary suture of the larger wounds after the application of sulphonamides may be carried out within twelve hours, the general impression is against this procedure. On the other hand, some surgeons have reported success from primary suture in wounds two to three days old, but as infection has already taken place in these late cases formal excision is not indicated: the wound should be opened to provide free drainage, necrotic muscle and retained missiles removed, sulphanilamide introduced, the wound covered with vaselined gauze, and the limb encased in plaster or splinted. When infection has been overcome secondary suture can be undertaken.

BOMB INJURIES

Fortunately the number of wounded has not come up to expectation; a higher proportion are mortal, however, and this is reflected in the low percentage of survivals from abdominal and chest wounds in comparison with the more numerous wounds involving the limbs. There is not so much of that extensive ploughing up of the tissues from high explosive and shrapnel as in the last war, for the modern bomb is more destructive than maiming. Its casing is comparatively thin, and its terrific blast breaks this up into numerous small hot fragments which spread out fanwise in a more or less horizontal direction with low trajectory. Wounding is more common from the secondary effects of the blast, either from shattered glass or from falling masonry. Consequently we may stigmatize this war of aerial bombardment as one of multiple injuries and marked traumatic shock. It is often difficult, therefore, to determine which of these small multiple injuries involve the more important structures, such as vessels, nerves,

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and viscera; and they cannot be dismissed by their apparent triviality, for severe venous thrombosis may follow from infection driven into superficial veins, and nerve injuries in particular are apt to be overlooked.

Regional injuries

It is impossible in a short paper of this kind to enter fully into the injuries of the different parts of the body, so a brief summary of the most salient points must suffice :—

Head.—Four principles of general application may be cited here: (1) Remove infective material and dead brain tissue. (2) Remove blood clot, extradural or subdural, and aerocele. (3) Consider whether a retained foreign body should be removed on account of traumatic epilepsy. (4) There is a definite impression that the sulphonamides tend not only to localize infection but to delay the necessity for operation: this is therefore a hint towards the adoption of more conservative methods. The most important fact to be established is whether the dura has been penetrated or not, and every means should be employed to this end. When the dura is opened damage to nervous pathways, spread of infection to the ventricles and basal cisterna, later abscess, and epilepsy must be borne in mind. The dural wound should not be enlarged unless the surgeon is prepared to remove necrotic brain and clot to prevent tension, otherwise fungus of the brain will develop. Forcible irrigation and suction should be used for this, and at the same time all dirt, foreign bodies, and detached bone must be removed. Repair of the dura is unsafe, and tension should be controlled by repeated lumbar puncture. Retained missiles should be left alone, but if the clinical signs spread and the cerebrospinal protein content increases, bold measures for their removal should be undertaken. Compared with civil injuries, concussion is usually slight, but unconsciousness may occur late and be prolonged. Focal symptoms are frequent: they tend to recover, and operation is indicated only when they come on late.

Abdomen.—The mortality rate from abdominal wounds is high, and the principles of treatment remain fundamentally the same as during the last war. All undoubted peritoneal wounds must be operated on, and the mortality depends largely upon how soon this is achieved. Essentials for success are accurate localization of the missile, local patching instead of resections, and end-to-end anastomosis for preference, control of bleeding, cleaning out of the peritoneal cavity, and—rarely—drainage, except in the late cases, and then suprapubically. Time and speed, too, are essential. Multiple ileostomies are of no value, but cæcostomy may prove a useful outlet for distension. Sulphanilamide dusted on the suture line and 5 per cent of this powder given with saline into the peritoneal cavity is a procedure that has been recommended by some surgeons. It is gratifying to hear that retroperitoneal hæmatoma, so fatal in the last war, has shown some recoveries with chemotherapy. Wounds of the liver, spleen, kidneys, and bladder should be treated on conservative lines. Abdomino-thoracic wounds, whether approached from the abdomen, thorax, or both, should ensure repair of the diaphragm. Late cases of peritonitis in which there is reasonable evidence of involvement of the bowel should be operated upon.

Chest.—Like wounds of the abdomen, chest wounds are of low incidence and high mortality. It is probable that a large number of these cases do not reach base hospitals. Operative intervention for hæmorrhage from the parietes or lung should be undertaken at once. Open pneumothorax is the bugbear of these sucking wounds, and must be stopped up at once by vaselined gauze dressings and strapped. Pressure pneumothorax can be gauged by trachea deviation radiologically and relieved by needling. Repeated aspiration should be performed for hæmothorax, and, if infected, rib resection with closed drainage. Foreign bodies, unless large and in the dangerous area of the hilum of the lung and pericardium, are better left alone. For shock and loss of blood, plasma and whole blood are given in large quantities, up to 5 to 6 pints, the aim being to maintain the hæmoglobin at about 80 per cent. Oxygen given by the B.L.B. mask is invaluable. Local application of sulphanilamide into the wound is good, but the results of employing it in the pleural sac are as yet inconclusive.

Chemotherapy for war wounds

Perhaps the most fascinating aspect of the treatment of modern war wounds is the advent of chemotherapy as an adjunct to surgery. Though the use of these sulphur compounds must still be regarded as in the experimental stage, there is a general consensus of opinion that where they have been employed wounds are less heavily infected and in a healthier state than corresponding wounds in the last war. Much experimental work has been done with sulphanilamide, sulphapyridine, and sulphathiazole. Colebrook considers that local application is superior to the oral route, and has higher expectations from the use of sulphadiazine. Fleming prefers sulphathiazole. The effects of these drugs have been most notable in the streptococcal infections, especially in the cleaning up of late wounds. The anærobic group as a whole is less susceptible to their action, but it is fortunate that *B. welchii* is more susceptible than the other members of this group. Antitoxic sera have also given protection against these infections, but at the moment no comparative results, or results from combined sulphur and toxin prophylaxis, are available. It is considered that these substances, of varying solubility, act direct on bacteria and arrest their metabolism.

Burns

One of the curses of the internal combustion engine is the risk of burns, and the war has acutely accentuated the importance of this problem, which calls so much for team-work and treatment from different points of view. The tannic-acid method, devised by Davidson of Detroit in 1925, so successful before the war, led to neglect in the study of some of its pathological problems. War burns present special difficulties of their own, in which the primary objects are to save life and limb and to preserve function. The main cause of dissatisfaction with the tannic-acid treatment is that in the commonest types of burns—*i.e.*, those involving the face and hands of airmen—it has led to severe scarring and to gangrene of the fingers. There has followed a great deal of ingenuity in trying out new methods of treatment, but as yet no unanimity of opinion as to their respective values has been arrived at. They may be summarized as follows:—

1. The Triple-dye Method.—This, consisting of gentian-violet 2 per cent, brilliant green 1 per cent, acriflavine 0.1 per cent, is recommended by Rear-Admiral Wakeley, who claims that when sprayed on the burn it produces less scarring than tannic acid.

2. The Bunyan Bag.—In this method the burnt surface is isolated in a special watertight envelope, and is irrigated with electrolytic sodium hypochlorite solution (5 per cent milton).

3. The Edinburgh school recommends the application of sulphanilamide and glycerine.

4. Saline baths:

If tannic acid has been found unsatisfactory for certain forms of burns it must not be concluded that it should be discontinued. Outside the areas of the extremities and flexures it still has firm and ardent advocates, and considered by many the best form of treatment when applied over a burn dusted with sulphanilamide. Whatever method is decided upon, the burnt area should be thoroughly cleaned with saline and dried with hot air. For this purpose gas-and-oxygen, evipan, and pentothal are the most satisfactory forms of anæsthesia. When the tan falls off in the course of a few weeks the part should be rubbed with lanolin, and any cracks in it can be dusted with sulphanilamide. Tanning has reduced streptococcal infection, but where this is present in late cases the tan should be removed and saline baths given. From the point of view of the plastic surgeon, the school led by Gillies insist that such treatment is satisfactory only for burns of the first and second degrees. For burns

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of the third degree they recommend surgical excision of the burn, saline baths, and Thiersch grafting as soon as a satisfactory granulating surface has been obtained. By these means unnecessary scarring and deformity are avoided.

Apart from the treatment of the actual burn, it is in dealing with its complications that work is so desirable. Primary shock has a mortality rate of 2 per cent to 3 per cent, whereas secondary shock, which comes on later, has a danger-point during the subsequent twenty-four to forty-eight hours, with mortality as high as 60 per cent. Unless there has been concomitant hæmorrhage, blood transfusion is not indicated owing to the concentration of the blood which occurs, and blood plasma must be given to replace protein loss and prevent œdema.

BLAST INJURIES

The highly explosive force due to the sudden conversion into gases of solid material under great pressure within the modern bomb has given rise to a series of phenomena which have come to be known as 'blast injuries'. Blast has shown curious anomalies in its direction, distribution, and force. It is probable that these are due to the breaking of the casing at its weakest point and to the waves of pressure being ricochetted or reflected by buildings in the vicinity of the explosion. The effects of blast on animals have been studied by Zuckerman. A wave of high-positive-pressure velocity is created, and this is followed by another of negative decreased velocity exerting a suction-like action. The high-pressure wave falls to atmospheric pressure over a distance of some thirty feet, but proximity to the actual blast does not necessarily determine its effects upon its victims. Usually it gives rise to no surface injury, and is characterized by blood-stained froth at the mouth, which may appear sooner or later, but within ten days. Clinical examination of the chest reveals the signs of pneumonia. Necropsy discloses hæmorrhage of varying extent in the substance of the lungs. Similar hæmorrhages may also be found in the liver, spleen, intestines, adrenals, kidneys, bladder, and, seldom, the brain. The force of the blast may hurl people against objects and so give rise to secondary injuries, which may cause the blast injury to be overlooked. Fat embolism is also sometimes found at necropsy.

From the surgical point of view these patients give rise to much anxiety. Like pleurisy, the chest condition is often associated with rigidity of the abdomen, and yet due regard must be paid to the possibility of a concomitant intra-abdominal lesion, while in either case inhalation anæsthesia is best avoided.

CRUSH INJURIES

Different methods of warfare either bring new problems or revive old ones in new disguise, and the crush syndrome may well fall into either category. It is characterized by acute renal failure supervening in people who have been pinned down by fallen masonry and have been buried and subjected to pressure for a varying period. There may be no evidence of any local injury, but, when there is injury, local swelling, œdema, whealing followed by bullous eruption, and patchy areas of anæsthesia appear. A few hours later, in spite of vaso-constriction as shown by pallor, coldness, and sweating, the blood pressure falls and hæmo-concentration rises. Later the urinary output diminishes, and albumin and dark-brown clots appear in the urine. The patient becomes alternately alert and drowsy, and his blood pressure often rises. Œdema, vomiting, and thirst supervene, the blood urea and potassium become increasingly high, and death takes place about the seventh day. Post-mortem examination shows necrosis of muscle, and cloudy swelling and degeneration of the renal tubules.

SHOCK

'Shell-shock' to those who knew it during the last war has taken a holiday, and has been replaced by traumatic shock of varying and severe degree; for, apart from wounds, it is a handmaiden to burns, blast, and crush injuries. There is little new to add to the question of shock; but from the observation of cases of uncomplicated shock at Charing Cross Hospital the following points may be stressed. The mental state of the patients, all of whom had received morphine, was quiet and still; very few of them were excited. In general they were pale, dry-skinned, and thirsty; one patient sweated profusely. Some had nausea and vomiting. The pulse was never above 100; its quality varied, being thin, impalpable, or collapsing. In all cases the blood pressure was below 100. A rise of 10 points in blood pressure, and improved temperature and colour and mental state, were taken as indications to warrant surgical intervention. As a rule the need for transfusion was in proportion to the severity of the injuries. Plasma was given, and whole blood if hæmorrhage had occurred. In severe shock transfusion may be difficult owing to the collapsed condition of the veins, and local warming of the arm has proved helpful in getting the blood in satisfactorily. The organization of the blood transfusion service has been one of the main successes of our hospital system, and the prompt access to reserves of stored blood has been most helpful and has resulted in the saving of many lives.

The Drugs Used in the Treatment of Amœbiasis

By E. E. NELSON, M.D.

(Abstracted from *International Medical Digest*, Vol. XXXIX, July 1941, p. 54)

WHEN a number of different agents are in use in the treatment of a particular pathologic state or infection, none of these agents is completely satisfactory. In no field is this more true than in the treatment of amœbiasis. There are to-day three groups of substances generally recognized as having merit for use in this condition. These are: one of the alkaloids of ipecac, emetine; various halogenated quinoline derivatives, chiniofon, vioform, and diodoquin; and certain organic arsenic-containing compounds, carbarsone and acetarsone.

The ætiological agent is of course a particular species of amœba, *Entamœba histolytica*, which lives both in the lumen and in the tissues of the intestine, chiefly the large intestine, of human beings. Occasionally the lower part of the small intestine and the appendix may show evidence of injury. The species is normally a tissue dweller. The injury which is induced is at least in part due to a cytolysis of the cells in proximity to the invaders, with formation of lesions of all degrees of severity, from a superficial necrosis to deep abscess and ulcer formation. In these lesions and in the lumen the amœbæ live and multiply. If circumstances are unfavourable, cysts are formed which are passed in the fæces. These cysts are the usual infection forms for the next host. According to Craig the cysts are not resistant to sunlight or drying, so that contamination of food by dust is not possible. Not all who are infected with *Entamœba histolytica* develop symptoms severe enough to bring about medical examination and recognition of the invasion. Individuals in whom this is true may serve as carriers, and are potentially dangerous, especially if they are engaged in the handling of food. A relatively frequent and serious complication is liver abscess. In these abscesses motile forms are found.

Amœbiasis is by no means solely a disease of the tropics and subtropical regions, and because 'dysentery' does not always occur in cases of amœbic infection, diagnostic failures are common and significant.

To return to the problem of therapy and the agents available, one must consider not only relief of symptoms in the patient with frank 'amœbic dysentery',

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but also the sterilization not only of these cases, but also of carriers, symptom-free or otherwise, and also the treatment of complications such as liver abscess. In order to get at the parasites, one must then have an agent which is absorbed and carried by the blood stream to the tissue invaders in sufficient concentration to be toxic for them, and which at the same time is present in the lumen of the intestine in amounts adequate to destroy both motile and encysted forms. This requirement is of itself difficult enough to meet, but at the same time the ideal therapeutic agent should be free of danger or discomfort to the human host.

It may be said at once that there is as yet no single substance available that fulfils the above requirements. At the same time it is possible by persistent and intelligent use of one or more drugs to cure a large per cent of the cases of invasion by this parasite. Therapy as practised to-day is a relatively new development. The oldest drug in use is emetine. It was isolated as early as 1817. Ipecac (ipecacuanha) had been used for many years in the treatment of dysentery, particularly by English practitioners in India, but not until 1910 were actually planned studies made of the action of ipecac and its alkaloids against the organisms of dysentery, both bacillary and amœbic. As a result of experiments by Vedder, Rogers tried the parenteral administration of the alkaloid and in 1912 reported 'the rapid cure of amœbic dysentery and hepatitis by the hypodermic injection of soluble salts of emetine'. Up to this time therapeutic advances consisted chiefly of development of methods for giving ipecac without causing nausea and vomiting. Rogers believed emetine to be as specific for amœbiasis as arsphenamine for syphilis, but considered opinion to-day does not rate emetine so highly. The experiences in the treatment of amœbiasis in the last World War revealed that many of the so-called cures by emetine were in fact followed by relapse. To-day it seems to be the general view that emetine is not an effective curative agent, but that for control of symptoms and for treatment of the complications it is excellent. Since it is usually given parenterally, some degree of absorption is insured, and the drug reaches the motile amœbæ *in* the tissues. For these it seems to be directly toxic, though the mode of action is not entirely clear. Earlier experiments in the test tube seemed to indicate a very low toxicity for the amœbæ, less than that of quinine, which is not an effective amœbicide. Later more accurately controlled work has shown that motile forms in culture may be killed by concentrations of emetine as low as 1 : 5,000,000. Just what concentration may be reached in the blood stream or in the fluid in liver abscesses, has apparently not been determined. At any rate the symptoms may be relieved, almost dramatically in some cases. But the encysted forms are not killed and probably motile forms in the lumen of the intestine are not all destroyed. At any rate relapse, which conceivably may be reinfection of the tissues by these lumen dwellers, is the rule. According to Faust, cure is induced by emetine alone in only about one-third of the cases. Used in the relief of abdominal distress and other gastro-intestinal symptoms, and in cases of liver abscess, the dosage usually recommended is 1 grain (0.065 gm.) of emetine hydrochloride in solution, subcutaneously, daily for 12 days. No further injections should be given for a period of one month.

Emetine is generally recognized to be a toxic substance, slowly eliminated, with potentialities for cumulative injury. Exact knowledge of the toxic dosage for human beings has not been worked out satisfactorily, although Leake believes they are of the same order as those found in laboratory animals. In these the lethal dose is about 25 mg. per kg. In view of the lack of satisfactory information caution should be followed and patients under treatment should be hospitalized.

The toxic effects which have been noted are: nausea and vomiting, severe diarrhœa with pronounced depression, cardiac irregularities and fall in blood pressure, muscular weakness with pain and tremors. A peripheral neuritis with wrist or toe drop has been described, but also denied. In rabbits poisoned experimentally a definite injury to heart muscle has been found. In a general way one feels impelled to remark that the toxic effects of emetine do not seem to have been determined very clearly, and offer a field for investigation.

Since emetine is now recognized to have little action on the lumen dwellers or on the cysts, it is logical to think of administering some drug by mouth or by rectum that may reach these forms. For this purpose two groups of substances, various halogenated quinoline derivatives and organic arsenicals, have been used by both routes of administration. Regarding the relative effectiveness of the members of these two groups there is some difference of opinion. Craig considers chiniofon the safest and most effective substance, whereas Reed places carbarsone first.

Chiniofon, which is official in the U.S.P. XI in the form of the powder of chiniofon, a mixture with sodium bicarbonate, is a quinoline-sulphonic acid containing 1 molecule of iodine. It was introduced into medicine under the proprietary name of yatren, and has also been known as anayodin and by many other names. It contains about 27 per cent iodine and was originally introduced as a substitute for iodoform in wound disinfection. Later it was found to be of value in the treatment of amœbiasis. It has a very low toxicity for the host in therapeutic dosage. However, about 40 per cent of the patients may show a rather marked diarrhœa which may last several days. The method of administration recommended in the Department of Tropical Medicine at Tulane is to give four 4-grain tablets (0.25 gm.) after each meal for seven days. No special preparation is necessary and patients need not be hospitalized. The dosage recommended for children is 1 grain (0.065 gm.) three times daily for each 10 pounds of weight. If the stools remain positive for *E. histolytica*, the treatment may be repeated after a rest period of at least a week.

Two other substances similar to chiniofon chemically have been used for the same purpose with quite similar results. Vioform, also originally introduced as an iodoform substitute, is a chlorine instead of a sulphonic acid derivative of quinoline. Its percentage of iodine is therefore higher (about 40 per cent). It is not very soluble, and is also somewhat irritant so that it cannot be used rectally. It acts as does chiniofon on both motile forms and cysts. Reed rates it above chiniofon. The dosage recommended at Tulane is 4 grains (0.25 gm.) in capsules three times a day for 10 days; for children, 1/3 grain (0.020 gm.) per 15 pounds is given three times a day. This drug also is frequently followed by diarrhœa.

Recently a third iodine derivative of quinoline has been introduced for amœbiasis, namely, diodoquin. This material, which contains about 64 per cent of iodine, has been studied by several observers and found to be quite similar in action and results obtained. Again, to refer to the practice of the Department of Tropical Medicine at Tulane, Faust recommends its trial when two full courses of chiniofon have failed. The dose is from 22 to 30 grains (1.5 to 2.0 gm.) daily for two to three weeks.

The organic arsenical preparations now used in amœbiasis, like the quinolines, were introduced for treatment of other conditions. The only one in extensive use is carbarsone which Ehrlich introduced in 1909. In 1930 Leake and his associates demonstrated its value in experimental amœbiasis, and its relatively low toxicity by mouth. Subsequently Reed has indicated that this drug is the best therapeutic agent available. The dosage is usually 4 grains (0.25 gm.) twice daily for 10 days. Because of the recognized toxicity of arsenic compounds for liver and kidney, it probably is wise not to use this particular drug in the presence of evidence of disease of liver (including liver abscess) or kidney. Several authors have reported better success (fewer relapses) when oral treatment with carbarsone was combined with retention enemas of chiniofon.

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Reviews

PRE-ECLAMPTIC TOXÆMIA OF PREGNANCY.—By Lewis Dexter, A.B., M.D., and Soma Weiss, A.B., M.D. 1941. Little, Brown and Company, Boston. Pp. xviii plus 415. Illustrated

THIS monograph is the result of several years' observation on the part of one of the authors, and following this of intensive investigation into every aspect of the group of diseases which come under the heading *Toxæmia of Pregnancy*.

An enormous number of experiments have been done, carefully described, and the results tabulated. The functions of the liver, kidneys, heart and vascular systems have been carefully probed, and the effects of uncomplicated pregnancy, complicated pregnancy, and experimental pregnancy on these organs have been observed and correlated. But alas, out of all the work of which this book is the monument, the ætiology of this group of toxæmias of pregnancy is as far away as ever. Yet it is the hope of the authors that though they may be said only to have clarified to a certain extent the syndrome of the toxæmias of pregnancy, yet a detailed study of their efforts may clear up hitherto confused issues which may enable other workers in the future to open up our knowledge still further.

The book commences with a short but extremely interesting history of the disease as it was known from the days of Hippocrates, the 'Father of Medicine' having observed all the symptoms and signs which are to-day described as 'cardinal'. The dicta of such famous obstetricians as Mauriceau, who in 1740 stated that after the delivery of the child the mother's eclamptic condition got better, and Denman who in 1769 made the same observation as Mauriceau, but further stated that a too rapid delivery was contra-indicated in the interests of the mother, are detailed in the text. Many other famous obstetricians of earlier years are quoted, and finally those of the present time. Then follow the numerous items of experimental and research work with a complete bibliography.

The work is of course above the heads of the average under-graduate student, but is invaluable to specialists in obstetrics, especially to those who are teachers, and who merit the term, 'savant'.

H. E. M.

MANAGEMENT OF THE CARDIAC PATIENT.—By William G. Leeman, Jr., M.D., F.A.C.P. 1940. J. B. Lippincott Company, Philadelphia and London. Pp. xx plus 705, with 255 original illustrations (two of which are in colour). Price, 35s.

A SPECIALIST is so much engrossed with the technical aspects of the subject—for instance, a cardiologist with his electrocardiograph—that he is liable to overlook the management of an actual case. On the other hand, a general practitioner is so busily engaged in treatment that he has little time to take note of the rapid strides in electrocardiography and radiology in the diagnosis, treatment and prognosis of heart disease. The author of this book has hit on the right point and has helped to fill this gap, by putting together various methods in the scientific investigation of a cardiac patient and the essentials in the management of the case.

The book begins with a brief consideration of the clinical methods commonly employed in arriving at a diagnosis of heart disease, succeeded by a chapter on heart failure. Next, the problem of rheumatic heart disease has been dealt with; in this connection the view that rheumatic fever, chorea or mitral stenosis does not occur in tropical climates can no longer be supported. Thereafter, the main features and management of various diseases of the heart have been considered, the account being thorough and comprehensive. With regard to the recently advocated heparin-sulphapyridine therapy in sub-acute bacterial endocarditis, the author's experience has been most disappointing.

Paravertebral alcohol injections to relieve the pain of serious types of angina pectoris have been found to be safe and effective in expert hands. Beck's operation for coronary disease appears to have a future. The chapter on cardiac emergencies has been presented in a practical style that will prove very useful for ready reference. A small section has been devoted on social service in the treatment of heart disease. The book ends with the introduction to the study of electrocardiography. A knowledge of the fundamentals of this subject can no longer be disregarded by a progressive physician.

The volume is profusely illustrated, and there are many case reports with relevant discussions. By outlying the diagnosis and treatment of such a large number of cases, the author offers to the practitioner an example of practically every cardiovascular problem which he may encounter in practice.

This is an excellent book with a high standard of production that can be strongly recommended to the members of the profession.

R. C.

ARTHRITIS AND ALLIED CONDITIONS.—By Bernard I. Comroe, A.B., M.D., F.A.C.P. Second Edition. 1941. Henry Kimpton, London. Pp. 878. Illustrated with 242 engravings. Price, 42s.

THE book begins by the statement 'arthritis is one of our oldest and most neglected diseases'. If this can be said in America, what about it in this country? There is undoubtedly lack of facilities for proper care of our arthritic patients, many of whom are in a pathetic incapacitated state.

This is an excellent book. We welcome the second edition, the appearance of which in so short a period of time testifies its real demand.

Important changes have been made practically in every chapter. In addition, several new chapters have been written, incorporating all the latest developments on the subject. The book describes the methods of diagnosis and treatment of various types of joint disease, which are of practical value to the physician. Numerous quick reference summaries are given that will prove very useful to a busy practitioner in treating this disease. There are numerous illustrations that have been nicely reproduced.

Rheumatoid arthritis, in all its aspects, has been dealt with thoroughly. More than 100 pages have been devoted to a discussion of the diagnosis and treatment of backache and sciatica. There is a good account of various other subjects, such as physiotherapy, gold therapy, the rôle of vitamins, allergy and endocrine glands, degenerative joint disease, fibrositis, infective arthritis, etc. The last chapter deals with the use of sulphonamide preparations.

The book is a mine of information, and will prove to be a valuable addition to a physician's library.

R. C.

A DIABETIC MANUAL FOR THE MUTUAL USE OF DOCTOR AND PATIENT.—By Elliott P. Joslin, M.D., Sc.D. Seventh Edition. 1941. Henry Kimpton, London. Pp. 238. Illustrated. Price, 10s. 6d.

WE welcome the seventh edition of Prof. Joslin's *Diabetic Manual*, the predecessors of which have always been of great value to patients and doctors alike.

The book has mainly been written for the benefit of diabetic patients, not only for helping them in the proper understanding of the disease they are suffering from but also to enable them to vary their diet for themselves without constantly referring for such advice to their doctors.

The book contains a mine of useful information which is not only of value to the diabetic patients but to the junior practitioners as well.

The book deals with in a short space almost all the aspects of diabetic life so that if the information given

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in the book is followed by patients they may expect to live the normal span of life with comfort.

The book has been thoroughly revised and contains illustrations which are both interesting and educative. We have no hesitation in saying that the book will be as highly appreciated as its predecessors.

J. P. B.

PHARMACOLOGY AND THERAPEUTICS.—By A. R. Cushny, M.A., M.D., LL.D., F.R.S. Twelfth Edition. Thoroughly revised by C. W. Edmunds, A.B., M.D., and J. A. Gunn, M.A., M.D., D.Sc., F.R.C.P. 1941. J. and A. Churchill Limited, London. Pp. 852. Illustrated with 66 engravings. Price, 30s.

CUSHNY will be remembered both for his work and for his book. The present authors who have been responsible for the last three editions of this book are maintaining the Cushny tradition, and the present edition is in every way the equal of its predecessors.

It is a sound and orthodox textbook and a very valuable book of reference. The reader in India may feel that perhaps the drugs used in tropical medicine might have had a little more special attention. Quinine, for example, is well treated, but there is very little about the other cinchona alkaloids. Again, one is a little disappointed not to find more about the antimony preparations, though the standard ones, neostibosan and urea stibamine, are mentioned. Carbon tetrachloride is described as being 'effective' in kala-azar; the statement may not be evidence of the writers' ignorance on the subject but at least it might mislead the student.

This Anglo-American book is published by Churchill and printed in America. As is the rule with books published by this firm, they have given us excellent value at a very moderate price.

AIDS TO BIOCHEMISTRY.—By E. A. Cooper, D.Sc. (Lond.), F.I.C., A.R.C.S. (Lond.), and S. D. Nicholas, B.A. (Oxon.), A.I.C. Third Edition. 1941. Baillière, Tindall and Cox, London. Pp. viii plus 240. Illustrated. Price, 5s.

WITHIN the last few years the advances in the field of biochemistry have been outstanding and hence the appearance of the third edition, about 3 years after its predecessor, is very welcome.

In the present edition several chapters, particularly chapters XI, XIII and XV, dealing with the subjects of enzymes, vitamins and hormone have been entirely re-written and expanded giving much newer knowledge to the reader.

A new chapter on sterols has been added and in it the author has made reference to carcinogenetic substances present in tar soot and some lubricating oils. It is also interesting to note in this connection that the author has made reference about the possibility of a relationship between tobacco smoking and the causation of cancer.

The book gives important practical and experimental methods very clearly and has in short dealt with the essential theoretical considerations without giving an embarrassing amount of details.

The book will be found useful to students of biochemistry not only as a manual for revision for purpose of examination but also as a laboratory guide for experimental work.

J. P. B.

ANATOMY AND PHYSIOLOGY FOR NURSES.—By W. Gordon Sears, M.D. (Lond.), M.R.C.P. (Lond.). 1941. Edward Arnold and Company, London. Pp. vii plus 376. Illustrated. Price, 6s.

THIS book has been written apparently with the object of simplifying the difficult subjects, anatomy and physiology, to a form in which the probationer nurse can readily assimilate the more intricate features.

Nevertheless, it seems to us that in many parts it is rather advanced for the junior nurse studying these subjects during the first twelve months of training.

It would be excellent for the senior student and also a good reference book for the trained nurse.

On page 87, figure 57, showing *x*-ray of shoulder, there is a misprint where the humerus is called the femur.

E. M. G.

Abstracts from Reports

ANNUAL REPORT OF THE EXECUTIVE HEALTH OFFICER, BOMBAY, FOR THE YEAR 1940

THE health conditions of the city during the year were decidedly better than what they were during the previous year. This fact may be judged from the total number of deaths which was 1,420 less than that registered in 1939. It is also noteworthy that the infantile mortality recorded during the year was the lowest since the year 1873.

The number of live births registered was 38,833, being 1,011 more than in 1939 and 6,189 more than the average of the last ten years (1930–39). The birth rate calculated on the census population of 1931 was 33.4 births per 1,000. The total number of deaths from all causes was 29,100, being 1,420 less than in 1939, 2,202 less than the average for the last five years (1935–39) and 443 more than that for the preceding decennium (1930–39). The death rate for the year per 1,000 of census population of 1931 was 25.0 as against 26.3 in 1939 and 24.4 the rate recorded for the decennium (1930–39). Thus the number of births during the year was more by 9,733 than the number of deaths. This excess of births over deaths was equivalent to 8.4 per 1,000 population calculated on the census of 1931 and was recorded ten times in succession. Before 1931 there was no such excess since 1866, the year in which birth records were instituted.

There was no death from plague during the year against 17 the average of the last ten years (1930–39). Smallpox caused 834 deaths against 201 in 1939 and 974 the average for the last decennium (1930–39). The disease was in an epidemic form from the first week of April to the middle of June. There were 6 deaths from cholera but they were all imported cases. The disease was absent during the preceding year and the average for the ten years (1930–39) was 18. Influenza was prevalent in a mild form in the city during the year and caused 42 deaths against 58 in the preceding year and 80 the average for the last decennium (1930–39). The deaths from diseases of the respiratory system numbered 9,441, being 1,331 less than in 1939 and 867 more than the average of the last ten years (1930–39). Tuberculosis accounted for 1,934 deaths as against 2,034 in 1939 and 1,793 the average for the preceding decennium (1930–39). Ninety-eight deaths were due to malaria, being 73 less than in 1939 and 13 less than the average of the last decennium (1930–39). There were 732 deaths from ague and remittent fever against 761 in 1939. The average number of deaths for the last ten years (1930–39) from malaria was 111 and from ague and remittent fever 1,259.

The deaths among infants under one year of age numbered 7,823 against 8,008 in 1939 and 8,168 the average for the last ten years (1930–39). The rate of infant deaths per 1,000 births registered was 201.4 as against 211.7 for the preceding year and 251.9 the mean for the preceding decennium (1930–39).

Compared with the decennial averages (1930–39) the total number of deaths shows an increase of 443.

ADMINISTRATION REPORT OF THE KING EDWARD VII MEMORIAL HOSPITAL AND THE SETH GORDHANDAS SUNDERDAS MEDICAL COLLEGE, BOMBAY, FOR THE YEAR 1940–41

THE Seth G. S. Medical College began to admit students from June 1925 and the K. E. M. Hospital was opened for the reception of patients in February

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1926. It is more than 15 years since both the institutions began to function. Fifteen years of useful service is a very short span in the life of an institution but an occasional retrospect of its past working helps to form a correct perspective in the light of which its future progress may be directed. With this object in view the following short account of the progress made by these institutions is given:—

THE HOSPITAL

The scheduled accommodation in the hospital was 304 beds in the beginning, out of which only 100 were fully equipped and available for patients in February 1926. By the end of March 1927 the total bed accommodation available was 267. This accommodation was raised to 310 in the beginning of year 1927–28. With the opening of the Nowrosjee Wadia Maternity Hospital in close proximity to the College on 13th December, 1926, the maternity section of the K. E. M. Hospital was closed as from 1st March, 1927. The closing of the maternity wards enabled the provision of separate wards for children who were till then warded in the female medical and surgical wards, respectively, and the increase of gynæcological beds from 20 to 35. On account of the marked popularity of the hospital within a short span of 3 years and the increased demand on its accommodation, the accommodation had to be increased from 310 beds to 334. Due even then to constant over-crowding in the wards, the scheduled strength of beds was increased from 334 to 354 in 1929–30 and was further increased to 370 in 1936–37. In spite of the successive increases in accommodation, there were still a large number of patients lying on the floor almost every day, year in and year out. The Corporation then thought it necessary to undertake a big scheme of hospital extension and at the same time decided to provide more beds for the floor cases thus increasing the strength of beds in the existing hospital from 370 to 426 which is the accommodation available at present. Under the extension scheme 106 more beds will be available.

The total expenditure incurred on the maintenance of the hospital during the year 1926–27 was Rs. 3,41,000. The cost per in-patient during the same year worked out approximately at Rs. 3-14-1 per day and the cost of the out-patient department worked at As. 0-7-2 per outdoor attendance approximately. The expenditure of the hospital has during the year 1940–41 increased to Rs. 6,11,669. The average cost per patient per day has now been reduced to Rs. 2-15-3 while that per outpatient attendance to As. 0-6-0 during the same year.

When the extension scheme is completed the total accommodation available in the hospital will be for 532 beds and in case of necessity as many as 580 patients could be comfortably accommodated in the hospital. Such an increase in bed accommodation will, besides giving medical relief to a large number of patients, add greatly to the facilities of the clinical instruction of the students of the Seth G. S. Medical College. At present each student has the sole charge of about 4 medical or surgical beds against the standard of 5 beds per student as prescribed by the Medical Council of India. When the extensions are completed the floor area in the outpatient department will be increased from 33,900 square feet to 64,500 square feet thus providing double and in some cases almost four times the area occupied by the existing departments, leading to great facilities of work and a quick disposal of patients.

THE COLLEGE

At the instance of the Trustees of Seth Gordhandas Sunderdas Charities the then Advocate-General offered to the Corporation Government Loan Notes of the face value of Rs. 12 lacs (which was subsequently increased to 14½ lacs) for endowing a Medical College in connection with the King Edward VII Memorial Hospital. The Corporation accepted this munificent offer. The construction of the college building was entrusted to the Tata Engineering Company which had also planned the K. E. M. Hospital. The College is a handsome three storeyed building designed in 'E' shape. The cost of constructing and equipping the College, including the cost of land, came to Rs. 17,45,017.

At the start the affiliation of the College was provisionally granted by the University of Bombay for a period of 18 months from June 1925 in the Faculty of Medicine for the course of study prescribed for the Intermediate M.B.B.S. examination. The Government were pleased to notify their sanction to the Senate's recommendation on 3rd September, 1925. The College began work on 1st June, 1925, with very scanty apparatus, furniture and almost with no library and gymkhana.

The permanent affiliation of the College to the University of Bombay for the courses for the M.B.B.S. degrees was sanctioned by Government in August 1926. The College is also affiliated to the College of Physicians and Surgeons, Bombay, for all its examinations.

Progressively the College and the Hospital have been also recognized for post-graduate degrees and diplomas granted by the University of Bombay as well as for various examinations held by the London University, the Conjoint Board (London), Royal College of Surgeons (England), and for the D. O. examination of the University of Oxford. The College is also affiliated to the University of Bombay for under-graduate and post-graduate courses of study in the Faculty of Science in the subjects of Animal Physiology, Comparative Anatomy, Embryology, Bacteriology and Micro-biology.

The College was allowed by the University of Bombay to admit 60 students to the 1st year class in 1926, which increased to 70 in June 1931 and to 80 in June 1934. The number of under-graduate students has increased from 46 in 1925, with 6 women students, to 426 in 1941, which includes 75 women students. The number of post-graduate students in March 1941 was 84 including 5 lady students.

As the College has been making the maximum number of admissions in the 1st year class as allowed by the University in 1934 the number of students obtaining on the roll of the College is likely to remain constant at present. As already stated the number of beds available per student at the K. E. M. Hospital is less than 5, the number required by the Medical Council of India. It is therefore not possible to increase the number of admissions to the first year class with the present bed accommodation in the hospital though the demand for increase in the facilities for medical education in the Presidency is growing every year as can be seen from the fact that no less than 451 applications were received for a possible admission of 75 seats in June 1941; exclusive of the five seats reserved for C. P. and Berar students since 1936 under a special agreement with the Government of that Province. The Government pays the Corporation a subsidy of Rs. 500 per student, per year.

The total expenditure on the College in 1926–27 came to Rs. 1,79,839 which has now increased to Rs. 2,77,087 in 1940–41. The revenue of the College in the form of fees which amounted to Rs. 32,682 in 1926–27 has increased to Rs. 1,23,006 in 1940–41. The gross cost per student which worked at Rs. 1,788 in the year 1926–27 has now been reduced to Rs. 650 in 1940–41 while the net cost which was Rs. 1,471 in 1926–27 has declined to Rs. 361-5-0 per student in 1940–41.

Museum.—Thanks to the timely donation of Rs. 1,10,000 in Government Promissory Notes given by the Trustees of the late Seth Jamnadas Lallubhai Charities, it has been possible to build the Seth Jamnadas Lallubhai Pathological Museum which was completed on 31st October, 1933, thus affording for the Pathology, Hygiene and Forensic Medicine departments an exhibitional area of 9,484 square feet as against the original area of 4,575 square feet that was available in the first construction, and which has since been given over to the Anatomy Department where a large part is set aside for study of Comparative Anatomy. The space so provided for museum

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purpose is already found too small to keep pace with the enthusiasm and work of the various departments and to meet the needs of instruction of students every corner and corridor space is now being utilized till more funds are available to complete the extension. The cost of constructing and equipping the museum came to Rs. 98,140. The amount by the sale of the securities of the face value of Rs. 1,10,000 came to Rs. 86,110. The rest of the cost was borne by the Corporation.

Hostel for men students.—This hostel was ready for occupation by students in June 1926 and in the beginning provided accommodation for 100 students and the cost of its construction and equipment came to Rs. 2,65,928.

Hostel for women students.—The construction of this hostel was undertaken in 1937 and the building was ready for occupation by women students in October 1938. The cost of construction and equipment came to Rs. 83,490. The expenses of this hostel in the year 1940–41 came to Rs. 4,171 while the income by way of rent amounted to Rs. 2,661. A resident Lady Superintendent lives on the premises.

Research.—In the first few years of the opening of the College the staff could not undertake research enquiries as the most important duty at that time was to organize and equip the various departments and to settle details regarding the instruction of students. Nevertheless a start in this direction was made in 1926–27 and efforts were made to secure grants or donations for the purpose from various sources. At present researches are carried on with the help of grants from the following funds and institutions:—

(1) Indian Research Fund Association.
(2) Seth G. S. M. College and K. E. M. Hospital Research Fund.
(3) Bombay University.
(4) Private Funds.

The Corporation were also persuaded to form a separate Fund under the Seth G. S. M. College and K. E. M. Hospital Research Endowment Fund. This Fund is found very helpful in taking up fresh inquiries and it is expected to exceed the sum of Rs. 40,000 during the course of the year 1941. Some of the members of the staff have been able to secure small grants for their researches from the University of Bombay every year. It is extremely gratifying to note that some members of the staff have volunteered contributions from their own pockets for the conduct of some of the researches. My grateful thanks in this respect are due to Drs. Purandare, Bharucha and Cooper who have each financed some of the researches conducted at this College, thus setting an outstanding example of the spirit of fostering original work both by personal direction and patronage. The amount spent on research up to 31st March, 1941, thanks to the generous help received from various sources, comes to over Rs. 83,000.

It has not yet been found possible to have a gymkhana pavilion and a playground. A plot at Naigaum has been reserved for the playground and the Corporation were pleased to make a provision for levelling the ground sometime ago. The plot at the Parel Tank area which is in Government possession was considered more suitable for the purpose and negotiations were going on for the transfer of the said plot to the Municipality. Just when the matter seemed to have been finally settled and the plot was to be handed over to the Municipality, the war broke out in Europe and the then ministry resigned. One does not know when this ground will now be made available for the use of the students. As however the need for the gymkhana ground is imperative, levelling of the plot at Naigaum and the construction of the gymkhana pavilion might have to be taken in hand shortly. Such needs cannot be put off indefinitely.

REPORT OF THE BOTANICAL SURVEY OF INDIA FOR 1940–41

GREATER use of the industrial section of the Indian Museum, Calcutta, has been made by the commercial community in having some of their trade difficulties solved. Assistance has been given by furnishing notes and reports on economic plant products and by giving advice on substitutes for imported commodities.

The industrial section has helped particularly in a thorough study of developing an essential-oil industry, in investigating possibilities of cultivating a number of perfume-yielding plants and in finding sources of indigenous vegetable dye-stuffs, of certain resin, gum and tannin-yielding plants and several industrial products.

Among enquiries dealt with by the botanical survey are possibilities of manufacturing agar-agar and iodine from sea-weed, the nature and remedy of black and brown patches on the canvas supplied to the army, possibilities of the cultivation of tung oil (Chinese wood oil) plants, information on oil-yielding grasses and cultivation of large numbers of medicinal plants.

Nearly 3,900 specimens were identified and revised during the year. Only 1,075 specimens could be distributed and the loan of herbarium specimens for purposes of critical study was restricted to Indian workers. Among a large number of exhibits added to the already rich collection of specimens in the public gallery of the Indian Museum are samples of some important commercial fibres, certain crude drugs, common Burma timbers and plywood.

The number of publications relating to several branches of Indian botany increased during the year to 127 as against 77 in the previous year.

A bulk purchase of quinine sulphate from Java enabled the Government of India to resume distribution of quinine to the provinces and Indian States. The total of cinchona products distributed during the year was 52,303 pounds. The stock of quinine sulphate at the end of the year was a little over 267,700 pounds and that of bark and cinchona febrifuge 207,872 and 8,943 pounds, respectively.

ANNUAL REPORT ON THE HEALTH OF THE ARMY IN INDIA FOR THE YEAR 1940

THE general health of the personnel of the British Army during 1940 has not been so good as in the immediately preceding years. For officers, compared to 1939, there has been an increase of 98.4 in the ratio of admission to hospital per 1,000 of strength and 2.81 in the death ratio. For other ranks there has been an increase of 57.2 in admission to hospital, but the number of deaths per 1,000 of strength, at 2.77, remains almost the same as in 1939.

Among factors which may have effected the incidence of disease, is the demand for field medical units for overseas service, so that the establishment of regular medical officers and assistant surgeons has fallen to a level only just sufficient to maintain the administration of hospitals in India. Numerous and frequent changes in the medical charge of units and the inexperience of young medical officers have had an effect in lowering the standard of medical and sanitary supervision and in interrupting the continuity of anti-malarial work. The tendency to treat in hospital cases which would be treated as outpatients was also noticed in some districts.

The presence of a larger number of troops in the plains throughout the hot weather and autumn, intensive training and the necessity of moves throughout this period had an effect on the incidence of sandfly fever, malaria and dysentery. There was a marked increase in the movements of units, often through unhealthy districts, and the arrival of young drafts and of men unaccustomed to India was a factor which has materially affected the general health of British troops, especially as most of these men arrived during the hot weather and many were kept in the plains.

The general health of the personnel of the Indian Army also has not been so good as in 1939 or in the years immediately preceding. For officers there has been a slight increase, from 462.1 to 466.4, in the ratio of admission to hospital per 1,000 but 1940 registered

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a decrease, from 14.75 to 13.25, in the average constantly-sick ratio per 1,000. For other ranks, however, there has been an increase of 95.0 in the admission to hospital ratio per 1,000 of strength and the average constantly-sick ratio per 1,000 has increased from 16.25 to 17.51. The death rate per 1,000 increased from 3.84 to 5.17 in the case of officers and decreased from 2.12 to 2.11 in the case of other ranks.

Considering that intensive training was in force, that there was a great deal of unavoidable overcrowding and that an unusually large proportion of the troops consisted of elderly reservists and youthful recruits, the health of the Indian Army during 1940 can be considered to have been satisfactory.

Malaria was the principal disease affecting both British and Indian other ranks, which showed a considerable increase in incidence as compared with 1939. In the Northern Command malaria once again resumed its position at the head of the list of diseases, after having been reduced below first place for three consecutive years. Without anti-malaria measures in this Command, which were effective, the admission rates might well have soared high.

The incidence of sandfly fever in British other ranks showed a further reduction during the year under review and reached one of the lowest figures ever recorded and there was a slight increase in the incidence of the enteric group of fevers and dysentery-diarrhœa group.

In Indian other ranks the incidence of smallpox further decreased from 0.2 to 0.1 per 1,000 of strength. The low rate of incidence of the enteric fevers was also maintained in 1940. It was below one per 1,000. There was a slight increase in the admission ratio of cerebro-spinal fever and dysentery-diarrhœa group.

Increase in the admission ratio of effects of heat per 1,000 of strength in British other ranks was from 2.3 to 6.1. Heat stroke showed an increase from 0.4 to 1.2 and heat exhaustion from 1.9 to 4.9. The practice of having reveille for troops in the hot weather later than was formerly the custom is considered to be beneficial. There is also a growing realization that it is better to keep the men actively employed during most of the day throughout the summer. The two serious outbreaks of heat exhaustion which occurred in the middle of the hot weather were reported from British units which had reveille excessively early and kept their men shut up in barracks most of the day. Owing to great increase in troop movements necessitated by war conditions, special measures were adopted to safeguard military personnel undertaking long train journeys in the hot weather.

Government military dairies, and the milk supplied by them, can be considered as having been very satisfactory during 1940. Considerable alterations, both inside and outside dairy buildings, are still, however, necessary before perfection is attained; but the standard of hygiene is, on the whole, improving each year. In all dairies a willingness to carry out hygienic recommendations, where possible, has been noticeable during 1940. The health of women and children in India owes a great deal to the high standard of milk supplied by these dairies.

During 1940 many medical officers were specially trained in advanced hygiene with a view to their becoming hygiene specialists. This training was carried out by means of lectures, practical demonstrations and by attachment to the office of deputy assistant directors of hygiene. This scheme proved to be a success and many competent hygienists were turned out during 1940. Special lectures and demonstrations on hygiene and sanitation were given to each class of emergency commissioned I.M.S. officers and I.M.D. personnel undergoing training at No. 1 Company I.H.C., Rawalpindi, throughout the year.

Very great improvements have taken place in the past twenty-five years in the water supplies of military cantonments in India; and these improvements are each year slowly being added to. The water situation in most stations of brigade size and upwards is now satisfactory, with a chlorinated pipe supply to the barracks. There are still, however, some exceptions. Plans to improve the situation in these places have been held up owing to the war. The situation in the majority of the smaller stations is little changed from what it was twenty-five years ago.

The present year has shown a further increase in child welfare work among Indian troops' families. The barriers of caste and religion, though still present, are gradually being overcome; and probably the care of the sick in the Indian families' hospitals is one of the most potent factors in bringing about this change.

The welfare work consists of two principal parts; the treatment of the sick and the hygiene of health families. Both these parts are essential; and the remarks of the president of one welfare centre are worth quoting. He states that 'The Indian troops families' hospital is the greatest asset in promoting the welfare and contentment of the unit'.

TRIENNIAL REPORT ON CIVIL HOSPITALS AND DISPENSARIES IN THE CENTRAL PROVINCES AND BERAR FOR THE PERIOD ENDING 31ST DECEMBER, 1940

THE number of hospitals and dispensaries rose to 392 [348]* owing to the opening of 51 dispensaries, all in rural areas, and of the women's hospital at Gondia and the closure of 8 dispensaries. The number of beds rose to 2,583 [2,394], the largest increase being in the Irwin Hospital, Amraoti (38). The number of indoor and outdoor patients steadily increased during the triennium, the number in the last year of the triennium being 49,692 [44,290] and 4,346,175 [3,591,292], respectively. The number of surgical operations also rose to 345,194 [341,356].

Although 51 dispensaries were opened in rural areas, considerable leeway has still to be made up in affording medical relief to rural areas, particularly as the death and infant mortality rates in this province are the highest in the country. With a view to quickening progress to suit the local conditions Government decided to enlist the help of indigenous systems of medicines to fight disease, after considering the report of the committee appointed to determine the place which these systems should occupy in the scheme of medical relief provided by the state. Two schemes were formulated in 1939, one for the establishment of 83 ayurvedic and unani dispensaries at the rate of one per tahsil and the other for subsidizing a similar number of ayurvedic and unani practitioners to settle in villages. So far 46 such dispensaries have been opened and 39 practitioners subsidized. It is too early yet to assess the value of this innovation, but Government feels that the schemes have not had much chance of success in the absence of an informed supervising agency. Recently therefore the creation of a post of inspector of indigenous medicine has been sanctioned. Legislation for the establishment of a Board of Indian Systems of Medicine for controlling and regulating the practice of indigenous systems could not be completed before the suspension of the constitution.

Simultaneously with the above two schemes, another for subsidizing 22 allopathic medical practitioners (one per district council) was prepared, and so far 9 practitioners have settled in villages. The progress is slow and disappointing owing to dearth of practitioners willing to settle in rural areas where the scope of private practice is necessarily limited; but Government is convinced that the problem of medical aid in the countryside with its distances, lack of communications and absence of urban amenities cannot be solved until this initial aversion to settle in a village is successfully overcome.

As 52 per cent of the mortality in the province is caused by malaria alone it is satisfactory to note that there was a general increase in the number of malaria patients seeking hospital treatment. This was due to the larger supplies of quinine available because of the Government of India grant.

There are four tuberculosis clinics in the province and these as well as the Pendra Road Sanatorium are

*Figures in brackets denote previous triennium.

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doing excellent work. Government notes with pleasure the tribute paid to the clinic at Nagpur by Dr. C. Frimodt Möller, the Medical Commissioner to the Tuberculosis Association of India, who described it as being undoubtedly one of the best tuberculosis clinics in India. The Provincial Tuberculosis Association has examined the suggestions made by Dr. Möller for improving the clinics and intensifying the anti-tuberculosis campaign and its recommendations are now being examined by Government.

The general tendency to become more hospital-minded is seen at its best in respect of leprosy. In 1936 the number of leprosy cases treated was only 1,390 while in 1940 the number was almost six times as large, *viz*, 7,849. The exact number of lepers in the province is not known but the number of cases seeking hospital treatment must be only a very small fraction thereof. The real problem in the attack on leprosy is the occupation of space in leper homes by burnt-out cases to the detriment of cases requiring treatment and hospitalization.

Yaws is widely prevalent in the aboriginal areas of the province and a cheap-plan dispensary has been opened at Bhamragarh in the Chanda district mainly for treating yaws cases. Recently a regular campaign for survey of the incidence of the disease and treatment of the patients by injections has been initiated in the aboriginal areas of the Chanda district out of the Government of India grant for the welfare of aborigines.

The Nurses' Registration Council has been constituted under the Central Provinces and Berar Nurses' Registration Act, 1936. The provisions of this Act which prohibit unregistered nurses, health visitors, midwives and *dais* from getting employment or practising have been applied to the whole province but it is apprehended that the paucity of trained *dais* specially in rural areas will make enforcement difficult in practice.

A scheme has been initiated for the improvement of the mental hospital, Nagpur, which has not kept pace with modern ideas of what a hospital of this kind should be. A six-year plan of improvement costing over rupees two lacs has now been drawn up and a total provision of Rs. 38,887 has been included in the current year's budget for increased staff, electrification, provision of iron cots for the patients, improvement of drainage, etc.

The period after the outbreak of the War has been a difficult one for the department, which had to carry on with a staff greatly depleted in strength owing to the deputation of officers of all ranks for military duty.

Correspondence

THE POTENTIAL DANGER OF *ANOPHELES LEUCOSPHYRUS* IN ASSAM

SIR,—The observations recorded by Clark and Choudhury (1941) are interesting as they show that *Anopheles leucosphyrus*, which has so far been regarded as harmless, may in certain localities prove an important carrier of malaria in Assam. Although the number of dissections are small, nevertheless the comparative statement of sporozoite indices of *A. leucosphyrus* and *A. minimus* published by these authors is sufficiently illuminating in regard to the susceptibility of the former to plasmodial parasites of man. Whether or not insufficiency of the number of cattle in Digboi has been responsible for the change from zoophilism to androphilism in this species must be at present regarded an open question.

Our experience in a locality at the foot of the Naga Hills near Dimapur suggests that under certain circumstances, which are insufficiently known, *A. leucosphyrus* may prove potentially dangerous. This place was visited by us during the rainy season in connection with a severe epidemic of malaria (some cases ending fatally) that occurred among the immigrant European and Indian population who were employed in a prospective oil mine. The camps of Indian employees were erected on hills about 100 to 300 feet high while those of Europeans were on a higher hill 500 to 700 feet.

There was no water-logging on the hills and all the breeding of mosquitoes was taking place in the streams and in numerous pools, ditches and *nullahs* at the foot of the hills which were covered with large and small trees and also shrubs. As the growth of vegetation was not so dense as to shut out the sun completely, it presented conditions ideal for the breeding of *A. minimus* and *A. leucosphyrus*.

Among wild mosquitoes caught in camps of Indian employees, those which incriminated with malaria were *A. minimus* in very large numbers. *A. leucosphyrus* were also obtained but in smaller numbers. *A. minimus* were curiously absent in camps used by the Europeans. Here a large number of *A. leucosphyrus* were captured. That this species was particularly prevalent in the European camps was confirmed from the catches of wild mosquitoes made by them in their camps for some days prior to our visit. As *A. minimus* was persistently absent in the higher camps, we were led to believe that *A. leucosphyrus* was the only species to be reckoned with in connection with the outbreak of malaria.

Though the mere presence of a species in the dwelling house does not necessarily point to its guilt, yet under the circumstances recorded above we were obliged to take notice of the potential danger arising out of the presence of *A. leucosphyrus* which had so far been considered harmless, although the extent of such danger could not be determined by dissection. It is interesting to point out in this connection that the androphilic index of *A. leucosphyrus* recorded by Ramsay and his collaborators (1936) in Assam was 75.5 as compared with 85.7 for *A. minimus*, though the receptivity of the former to plasmodial infection in Cachar (Strickland 1929, Ramsay 1930, Savage 1933) and in other localized areas in Assam has been proved to be insignificant.

Although in its breeding habits and in its tendency to be attracted to man there is a close similarity between the Indian and the Far Eastern types, it has nevertheless been strongly suspected of acting as a carrier in the Dutch East Indies, especially in Sumatra and Borneo. Both in wild mosquitoes and in those experimentally infected, the development of the parasites has never been found to proceed beyond the oöcyst stage. The literature on this subject has been reviewed by Covell (1927, 1931) and Stoker (1934). Other reports on the finding of oöcysts in wild mosquitoes have been published by Doorenbos (1931), Farinaud (1938), and Lefebvre (1938). Experimentally they have been infected up to a certain stage by Robin and Toumanoff (1934) in Indo-China and Bais (1920) in Sumatra, though Green (1934) and Swellengrebel (1919) failed to infect them.

Regarding its feeding habits Walch (1932) recorded the presence of human blood in 99 out of 100 and Toumanoff (1936) in 18 out of 19 and also in 3 out of 3 mosquitoes tested.

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CALCUTTA.

REFERENCES

BAIS, W. J. (1920) .. *Med. Kon. Inst. Amsterdam*, XIII, *Afd. Trop. Hyg.*, No. 8, p. 137.
CLARK, R. H. P., and CHOUDHURY, M. A. (1941). *J. Malaria Inst. India*, **4**, 103.
COVELL, G. (1927) .. *Indian Med. Res. Mem.*, No. 7. Thacker, Spink and Co., Calcutta.
Idem (1931) .. *Rec. Malaria Survey India*, **2**, 1.
DOORENBOS, W. B. (1931). *Geneesk. Tijdschr. Nederl.-Indie*, **71**, 1458.

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FARINAUD, E. (1938) .. *Bull. Soc. Path. Exot.*, **31**, 397.

GREEN, R. (1934) .. *Rep. Inst. Med. Res.*, F. M. S., 1933, p. 75. Kuala Lumpur.

LEFEBVRE, M. (1938) .. *Bull. Soc. Path. Exot.*, **31**, 381.

RAMSAY, G. C. (1930). *Indian J. Med. Res.*, **18**, 533.

RAMSAY, G. C., CHANDRA, S. N., and LAMPRELL, B. A. (1936). *Rec. Malaria Survey India*, **6**, 49.

ROBIN, L. A., and TOUMANOFF, C. (1934). *Bull. Soc. Med.-Chir. Indochina*, **12**, 245.

SAVAGE, J. DE LA M. (1933). *Rep. Assam Med. Res. Soc., Malaria Section*, 1933.

STOKER, W. J. (1934) .. *Geneesk. Tijdschr. Nederl.-Indie*, **74**, 1342.

STRICKLAND, C. (1929). *Indian J. Med. Res.*, **17**, 174.

SWELLENGREBEL, N. H. (1919). *Meded. Burgerlijk. Geensk. Dienst. Nederlandsch-Indie*, No. IX, p. 53.

TOUMANOFF, C. (1936). *Monograph Soc. Path. Exot.*, **4**, 434.

WALCH, E. W. (1932) .. *Geneesk. Tijdschr. Nederlandsch-Indie*, **72**, 682.

PELLAGRA IN THE UNITED PROVINCES

SIR,—With reference to the article on the incidence of Pellagra in the United Provinces by Dr. N. Ahmad, published in the March issue of your esteemed journal, I would like to draw his attention to the review by Dr. T. K. Raman (1940) in the *Journal of Indian Medical Research*, Vol. XXVII, p. 743, where he has also given a good survey of the incidence and symptomatology of pellagra in India and Burma, based on an analysis of 150 recorded cases.

I would like to draw his attention also to a case report published by me (1941) in the *Patna Journal of Medicine*, Vol. XVI. His statement that no cases have so far been reported from Bihar, therefore, does not hold good. At present I have another case under my treatment in my ward. Once the interest is created, more cases will be detected.

I fully agree with Dr. Ahmad's view that intensive nicotinic acid therapy gives uniformly good results in all stages and varieties of the disease.

S. K. GHOSH DASTIDAR, M.B. (Cal.), M.R.C.P. (Lond. and Edin.), D.T.M. (Cal.),
Lecturer in Medicine, Prince of Wales Medical College, Patna.

PATNA,
2nd April, 1942.

SURGICAL COMPLICATIONS OF FILARIASIS

SIR,—The article on filariasis by Dr. P. N. Ray, in the April number of the *Indian Medical Gazette*, has just come to my attention and I have read it with a great deal of interest. In addition to the drugs mentioned there for the treatment of this disease I would like to suggest one more which we have used at this hospital for a number of years with considerable benefit to the patients, namely, urea stibamine. The dosage is about the same as is used in the treatment of kala-azar, and 14 injections are given.

It probably cannot be claimed that this drug can cause a complete cure of the disease, but in most cases it does produce a decrease in the fever, swelling and adenitis, with relief of the suffering which these patients endure. In our opinion it gives the best results of the drugs we have used in the treatment of filariasis and has the advantage of being cheap as to be available to the poorer classes.

E. OSTERGAARD, M.D.

BENAGARIA CHRISTIAN HOSPITAL,
BENAGARIA P. O.,
DIST. SANTAL PARGANAS,
29th November, 1941.

Dr. S. Sundar Rao, the filariasis research worker at the Calcutta School of Tropical Medicine, comments as follows:—

'Various compounds of antimony such as fouadin (Bayer), anthiomaline (M.&B.), antimosan (von Heyden 661), stibosan (von Heyden 471), neostibosan (Bayer 693 b), Sdt. 561 (Bayer), stiburea (Union Drug Co.), novostiburea and antimony sulphur compound (Union Drug Co.), trystibine and stibilase (Meurice Belge) and A "534" (P. D. & Co.) were tried here at the School in the treatment of filariasis (*Indian Med. Gaz.*, LXIV, March 1929, p. 87, and *Indian Journ. Med. Res.*, 27, Oct. 1939, p. 549). None of these compounds had any lethal effect on the adult worm nor on the embryo. From the clinical point of view, some of these, for example, fouadin, gave good results and the frequency of the attacks of lymphangitis was reduced. But it is not always that we get good results from this treatment and the lack of uniformity in the results obtained makes us feel that antimony cannot be recommended for the routine treatment of filariasis. It would, however, be interesting to have some detailed data from Dr. Ostergaard regarding the number of cases he has treated, the dosage employed, the reactions observed and the actual improvements noted by him.'

Service Notes

APPOINTMENTS AND TRANSFERS

To be Honorary Physician to the King:—

Colonel R. Sweet, D.S.O. Dated 12th July, 1941, *vice* Major-General (local Lieutenant-General) W. H. Hamilton, C.B., C.I.E., O.B.E., D.S.P.

Lieutenant-Colonel W. M. Will, Deputy Assistant Director-General (Medical Stores), Madras, is appointed to officiate as Additional Deputy Director-General, Indian Medical Service (Stores), with effect from the 29th December, 1941.

The services of Lieutenant-Colonel A. S. Garewal, Superintendent, Central Jail, Nagpur, have been placed at the disposal of the Government of India, Defence Department, for military duty, with effect from 1st February, 1942.

The services of Lieutenant-Colonel A. S. Fry, Civil Surgeon, Simla East, are replaced at the disposal of the Government of the Punjab, with effect from the afternoon of the 5th February, 1942.

Major G. Milne, an officiating Agency Surgeon, on return from leave, resumed charge of his appointment as Medical Officer in charge of the Crown Representative's Police Force Hospital, Neemuch, with effect from the forenoon of the 1st February, 1942.

Major S. Smyth is appointed Civil Surgeon, Simla East, with effect from the afternoon of the 5th February, 1942.

INDIAN LAND FORCES
(Emergency Commissions)

The undermentioned Captains (on probation) are confirmed in their rank, with effect from the dates specified:—

P. L. Burman. Dated 2nd June, 1941.
T. S. Oberoi. Dated 5th June, 1941.
K. C. Varma. Dated 5th July, 1941.
L. Oswald. Dated 6th July, 1941.
M. S. Bazaz. Dated 19th July, 1941.
P. K. Gupta. Dated 3rd August, 1941.

The undermentioned Lieutenants (on probation) are confirmed in their ranks, with effect from the date specified:—

D. R. Desai. Dated 1st February, 1941.

5th June, 1941

M. Q. Ali.
Y. D. Deshpande.
N. M. Kalapesi.
T. N. Chacko.
J. Pakiam.
G. D. Agarwal.
G. W. Keswani.
J. C. Chakrabarti.
A. K. Das Dastidar.
V. K. Sundaram.
B. S. Nagra.
S. K. Suri.
M. A. Khan.
A. D. Paul.
J. L. G. Pinto.
M. A. Jan.
P. S. Raghavan.
G. D. Shenoi.

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D. P. Ray.
S. C. Srimani.
J. K. Bose.
J. E. G. Baker.
M. V. Singh.
C. S. Venkatasubramaniam.
C. S. Tamboli.
P. V. Krishnan.
D. S. Khatri.
N. F. Lilauwala.
K. Singh.
M. C. Muniswamy.
G. D. Joglekar.

6th June, 1941

A. K. Saha.
P. K. Sen.
R. K. Chettur.
K. S. R. Sarangapani.
R. Arunachalam.

7th June, 1941

B. Dyal.

5th July, 1941

B. N. Blaggan.
B. A. Rao.
H. R. Nischol.
R. Sukumaran.
V. K. Row.
R. C. Biswas.
J. S. Prakasa Rao.
B. B. Prashad.
K. S. Gill.
J. K. Sarkar.
G. G. Sahasrabudhe.
V. A. Mauskar.
M. Khan.
R. N. Sen.
S. D. Singh.
C. R. Abrol.
U. S. Sidhu.
G. M. Diwan.
P. Singh.
K. G. Bhatia.
R. N. Gupta.
R. S. Tata.
N. V. Subramanyam.
R. Krishnamurti.
A. P. Thiagarajan.
C. M. Nair.
R. N. Aiyar.
V. Sankaran.
I. Jahan.
C. L. Joshee.
B. L. R. Chowdhury.
A. K. Bose.
Y. G. Joshee.
D. Jayaram.
L. R. Marthandam.
M. V. Ramchandran.
C. R. Mannadiar.
K. Prabhakaram.
D. F. Vachha.
M. S. Mahadevan.
A. G. Rangaraj.
R. A. Jansen.
P. A. Menon.
N. Adiseshiah.
T. R. Muthurangam.
T. D. G. Sankar.
S. L. Bhandari.

6th July, 1941

P. R. Dutt.
M. Hatangdi.
G. P. Halder.
R. S. Hoon.
M. Mammen.
C. F. Varied.
N. P. Mahapatra.

7th July, 1941

G. A. Naidu.

10th July, 1941

R. S. T. Rajan.

Emergency Commissions

The undermentioned appointments are made to be Lieutenants:—

George Vermilyea Faulkner. Dated 1st November, 1941, with seniority from 1st November, 1940.

Thomas Hallam Spencer Smith. Dated 8th November, 1941, with seniority from 8th November, 1940.

Alexander Dacre Dayson.
Phillip Jacobs.
Wyndham Moody Jones.
Duncan Anderson Maclean.
Francis Antony Whittock.

LAND FORCES

To be Lieutenants (on probation)

George Henderson. Dated 5th December, 1941.
John Ogilvie Gordon. Dated 30th December, 1941.
Stanley Ferguson Thomas. Dated 5th January, 1942.
Dhanjishaw Dorabji Boovariwala. Dated 12th February, 1942.

The undermentioned Lieutenants (on probation) are confirmed:—

N. K. Mitra. Dated 1st July, 1940.
A. K. Dutta. Dated 15th February, 1941.

PROMOTIONS

Note.—The seniority of Captain J. Morgan in his present rank is ante-dated to 3rd August, 1936, and in the rank of Lieutenant to 3rd August, 1935.

INDIAN LAND FORCES

(*Emergency Commissions*)

Lieutenants to be Captains

N. K. Mitra. Dated 1st July, 1941.
G. B. Bowater. Dated 3rd July, 1941.
J. L. McCallum. Dated 24th October, 1941, with seniority from 3rd October, 1941.
J. M. Flower. Dated 2nd January, 1942.

3rd January, 1942

T. B. W. Phillips.
J. F. McGarity.
B. I. Evans.
E. G. R. Butler.
N. St. G. Wade.
R. Hermon.

C. M. Bisset. Dated 13th January, 1942.
A. W. B. Strahan. Dated 15th January, 1942.
D. Robertson. Dated 16th January, 1942.
D. R. Desai. Dated 1st February, 1942.
P. S. Fox. Dated 3rd February, 1942.

15th February, 1942

P. P. Rit.
K. G. Koshi.
V. K. Pillay.
A. K. Dutta.
P. N. Roy.
N. Khansur.
S. S. Sidhu.
M. S. Hashemi.
J. Chatterjee.
P. Subramanyan.
A. H. Minhas.
C. L. Sukhija.
D. R. Shirhatti.
R. Kaul.

B. C. Singh. Dated 17th February, 1942.

RETIREMENTS

Lieutenant-Colonel G. H. Mahony. Dated 22nd November, 1941.

Lieutenant-Colonel F. Phelan. Dated 18th March, 1942.

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Original Articles

THE TREATMENT OF KALA-AZAR BY DIAMIDINO STILBENE : ANALYSIS OF 101 CASES

By L. EVERARD NAPIER, C.I.E., F.R.C.P. (Lond.)
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and
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(*From the School of Tropical Medicine, Calcutta*)

Introduction.—About eighteen months ago, we (Napier and Sen, 1940) published a preliminary paper on the treatment of kala-azar by 4 : 4′-diamidino stilbene. At the time our paper was sent to press, there were in the literature—that had arrived in this country—only two detailed reports on cases treated by this drug (Adams and Yorke, 1939; and Adler and Rachmilewitz, 1939). Since then a small spate of reports has appeared. Kirk and Sati (1940) treated 8 cases of Sudanese kala-azar with remarkable success. Adams and Yorke (1940) treated a second case of Indian kala-azar. A further report by Kirk and Sati (1940*a*) referred to the treatment of 28 cases by this drug—this number presumably included the original 8 cases previously reported—and another 16 cases treated by allied compounds—the 'immediate-cure' rate was 86 per cent. Wingfield (1941) treated one case by diamidino stilbene and Adams (1941) a case by diamidino-diphenoxy-pentane. In trypanosomiasis, it has been used with success by McLetchie (1940), Harding (1940) and Bowesman (1940).

All report good results.

Recently, we (Napier and Sen Gupta, 1942) reported certain unusual neurological symptoms in 7 cases, following the use of this drug.

We have now treated a hundred cases of kala-azar and, as the drug may be considered by many to be still in its trial stages, we feel that we ought to report our experiences with it and make some attempt to appraise its true value as an anti-kala-azar drug.

The patients.—All except one were patients in the Carmichael Hospital for Tropical Diseases under the charge of the senior writer.

Racially, they can be classified as follows :—

Indians	85
Anglo-Indians	13
Europeans	2
	100

Sex.—Eighty-seven were males and thirteen females; the preponderance of the latter is of course due to the fact that men came more readily to hospital and that in our hospital there are more beds for men.

Age.—Their age distribution was as follows:—

TABLE I

	Age incidence		Age incidence
Up to 1 year	1	From 21–25 years	16
From 1–5 years	16	„ 26–30 „	12
„ 6–10 „	10	„ 31–35 „	6
„ 11–15 „	14	„ 36–40 „	9
„ 16–20 „	11	„ 41–50 „	5
			100

Duration of illness.—From the history of the duration of the disease the patients can be divided as follows :—

TABLE II

Duration	Number of cases	Duration	Number of cases
Up to 1 month	10	7–8 months ..	6
1–2 months ..	9	8–9 „ ..	1
2–3 „ ..	10	9–10 „ ..	2
3–4 „ ..	10	10–11 „ ..	0
4–5 „ ..	6	11–12 „ ..	15
5–6 „ ..	8	Over 1 year ..	18
6–7 „ ..	5		
		TOTAL ..	100

The mean duration of the disease was 8.22 ± 8.05 months, or about 8 months. In nearly half the cases the duration was over six months.

Diagnosis.—A diagnosis was made by demonstrating the parasite, in all except two cases; both these were children and quite clearly cases of kala-azar, in which for various reasons the attempt to demonstrate leishmania was not pursued.

The diagnostic procedures carried out and the results obtained were as follows :—

	Smears			Cultures *only* positive
	All	+	−	
Spleen puncture	32	28	4	3
Sternal puncture	78	69	9	1
Tibia puncture	2	1	1	—
*Peripheral blood	1	1	—	—

Sternal puncture was done in 78 cases, of which the smears were positive in 69. That is to say, in 9 (or 11.54 per cent) cases no leishmania was found by this method.

Spleen puncture was done in 32 cases, of which 28 showed parasites in the smears, and the other

*This observation was made when a blood count was being done. Search for leishmania in the peripheral blood was not carried out as a routine procedure.

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3 on culture only; that is, in 4 (or 12.5 per cent) no leishmania was found in the smears.

On superficial examination, this would appear to imply that the two methods of examination were equally reliable, but this argument is not valid.

Of the 9 cases in which the sternal puncture smear was negative, in 1 no further examination was done, as the culture of the sternal material showed leishmania, in 3 the spleen puncture smear was negative but the culture was positive, and in 5 the spleen puncture smear was positive. That is, of the 8 cases in which both spleen and sternal punctures were done, all the sternal puncture smears were negative, and 5 spleen puncture smears were positive and 3 negative. This certainly implies that spleen puncture is the more reliable method, but that when leishmania are scanty they may not be found in the smears obtained by either method.

In one child an unsatisfactory spleen puncture was followed by a satisfactory tibia puncture in which leishmania was found : this spleen puncture is not included in the table above as practically no cellular material was found on the film. In a second case the tibia puncture was negative, but the sternal puncture positive.

Aldehyde reaction.—This was done as a routine measure in every case, usually before admission, as a means of rough diagnosis. In 8 cases, it was completely negative. These were all early cases with small spleens, the largest being 3 inches below the costal margin : in one case (*2*) a long history of illness was given, but this was probably due to some other disease.

The findings are shown in tabular form below:—

Reading	Result	Frequency
+++	Positive	41
++	Positive	21
+	Positive	12
(+)	Doubtful	11
±	Doubtful	7
(−)	Negative	2
−	Negative	6

The blood picture

A full blood count was done on admission and at least once again, and usually at the time of discharge. A few of the features of the count are analysed.

Hæmoglobin.—This was done with the Hellige hæmoglobinometer; the results were recorded in grammes of hæmoglobin per 100 c.cm. of blood. In over three-quarters of the cases the hæmoglobin was between 6 and 11 grammes; in 4 it was below 4 grammes and in 6 it was above 11 grammes. These last 6 might be considered to be within the normal range, but far below the normal mean. Of the whole series, the mean and standard deviation is 7.96 ± 2.26 grammes. The frequency distribution is given below :—

TABLE III

Grammes of Hb. per 100 c.mm. of blood	Cases before treatment	Cases after treatment
2.1–3	3	..
3.1–4	1	..
4.1–5	8	..
5.1–6	6	..
6.1–7	17	..
7.1–8	12	1
8.1–9	18	5
9.1–10	17	14
10.1–11	13	15
11.1–12	3	23
12.1–13	2	12
13.1–14	1	17
14.1–15	..	5
15.1–16	..	2
TOTAL ..	101	94
Mean ± standard deviation.	= 7.96 ± 2.26	11.99 ± 1.70

(The final estimation is also given : reference is made to this later.)

The size of the red cells.—The frequency distribution of the mean corpuscular volumes (MCV) in the 88 cases in which this was calculated is as follows :—

TABLE IV

Mean corpuscular volume in cu. μ	Frequency
61–70	1
71–80	12
81–90	30
91–100	21
100–110	8
111–120	8
121–130	7
131–140	1

In only one case was the MCV below 70 cu. μ, whereas in 24 it was above 100 cu. μ. In the whole series the mean was 94.1 ± 15.2 cu. μ. This is not significantly different from the normal mean MCV of 90.49 ± 7.90 cu. μ (Napier and Das Gupta, 1936) in a similar population, but it indicates that the general tendency in this disease is towards an increase in the size of the cell.

Leucocytes.—In 33 cases the total leucocyte count was below 2,000 per c.mm., in 76 cases, or in over three-fourths, it was below 4,000 per c.mm., and in only two cases was it above 8,000 per c.mm.

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The distribution curve is given in the table below :—

TABLE V

Leucocyte counts

Range of leucocyte count in thousand per c.mm.	Frequency before treatment	Frequency after treatment
0.0–1.0	5	..
1.1–2.0	28	1
2.1–3.0	28	4
3.1–4.0	15	8
4.1–5.0	7	9
5.1–6.0	7	13
6.1–7.0	6	18
7.1–8.0	3	8
8.1–9.0	0	7
9.1–10.0	0	7
10.1–11.0	1	6
11.1–12.0	0	5
12.1–13.0	0	1
13.1–14.0	1	3
14.1–15.0	..	0
15.1–16.0	..	2
16.1–17.0	..	2
	101	94
Mean ± standard deviation.	3.47 ± 2.15 thousands.	7.36 ± 3.28 thousands.

TREATMENT

The specific treatment was usually commenced within about a week of the patient's admission into hospital, after he had been given a few days to settle down to his new conditions. Except in one case, to which reference will be made later, diamidino stilbene was the only specific drug given. The patient was usually allowed a full diet, unless he had hyperpyrexia or other symptoms, such as diarrhœa or dysentery, which contra-indicated this; symptomatic treatment was given for such conditions, but no treatment was given for concomitant infections, such as hookworm, until his anti-kala-azar treatment had been completed.

Resistant cases.—It became obvious very early in the series that the ordinary case of kala-azar was going to respond well to this treatment, so for a time we concentrated on 'resistant cases'. A 'resistant case' may be defined as one in which an ordinarily efficient course of treatment fails to effect a cure. There is certainly some latitude in the matter of deciding what constitutes an 'ordinarily efficient' course, but we usually accept 10 or more injections of neostibosan and 12 or more of urea-stibamine as satisfying this requirement; in most of the cases included in the resistant group at least this amount was given.

Route and routine.—The intravenous route was used in all but 5 cases; in these, intramuscular injections were given but they were very painful, though the drug appeared to be equally effective by this route. The drug was dissolved in sterile distilled water to make about a 1 per cent solution. The injections were given daily.

Dosage.—We varied the dosage slightly from time to time, but in the vast majority we adopted the plan of giving to an adult 0.025 gramme as the initial dose, followed by 0.050 g., 0.075 g., 0.090 g., and 0.100 g., provided the reaction after each dose was not a very severe one, and provided the dose did not exceed 0.001 g. (one milligramme) per pound weight of the patient. If the patient weighed more than 100 pounds we proceeded to increase the dose by 0.020 or 0.010 g. up to the maximum of 1 milligramme per pound. With small children we started with a dose of 0.010 g. and increased it up to the maximum by 0.005 g. stages. This initial dose meant that a relatively much larger dose was given to children, but we found that they always stood it better. If reactions were severe, we repeated the dose; very rarely did it seem necessary to reduce it.

We did not aim at giving any definite total dose or any special relative (relative to weight) total dose, but gave a course of 10 or 12 doses in ordinary cases and sometimes increased this up to 15 in resistant cases. In a few cases a second course was given, so that the number of injections reached higher figures, and in a few others the course was curtailed for various reasons.

The drug was still in the experimental stages, and we hoped by thus varying the dosage to get some information regarding the minimum dosage necessary.

Any attempt to follow a set plan was prevented by the very variable reactions that were encountered in different cases.

The *number* of doses given in ordinary and 'resistant' cases is shown in the table below :—

TABLE VI

Number of injections

Number of doses	Ordinary cases	Resistant cases
8	2	0
9	3	0
10	54	6
12	14	8
15	1	7
18	1	0
10 + 8	0	1
12 + 10	0	1
15 + 12	0	1
	75	24

The two patients who died are not included, and one patient who relapsed is reported as two cases.

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The *total dosage* in the various cases is shown below :—

TABLE VII

Total dosage

Range	Ordinary	Resistant
0.11–0.20	3	0
0.21–0.30	9	2
0.31–0.40	7	3
0.41–0.50	5	0
0.51–0.60	8	1
0.61–0.70	19	2
0.71–0.80	8	3
0.81–0.90	12	1
0.91–1.00	3	2
1.01–1.10	0	2
1.11–1.20	0	2
1.21–1.30	0	3
1.31–1.40	0	1
1.41–1.50	0	0
1.51–1.60	1	1
1.61–1.70	0	0
1.71–1.80	0	1
TOTAL	75	24

The mean total dosage in the 75 cases was 0.597 ± 0.245 gramme and in the 24 resistant cases was 0.884 ± 0.414 gramme.

The relative dose.—This is calculated on a 100 lb. basis, that is, the total dose per 100 lb. body-weight. This dosage in the different cases is shown in the table below :—

TABLE VIII

Relative total dosage per 100 lbs. body-weight

Range	Ordinary	Resistant
0.41–0.50	3	0
0.51–0.60	0	0
0.61–0.70	3	1
0.71–0.80	16	2
0.81–0.90	21	3
0.91–1.00	17	3
1.01–1.10	3	7
1.11–1.20	2	0
1.21–1.30	5	5
1.31–1.40	2	0
1.41–1.50	1	1
1.51–1.60	0	0
1.61–1.70	2	1
1.71–1.80	0	0
1.81–1.90	0	0
1.91–2.00	0	1
TOTAL	75	24

The mean relative total dose of the ordinary cases is 0.912 ± 0.224 gramme and of the 24 resistant cases is 1.009 ± 0.293 gramme.

Reactions

The general account of the reactions that occur has been given before (Napier and Sen Gupta, (*loc. cit.*); we have quoted from this account below :—

A burning sensation all over the body, flushing of the face, transient difficulty in breathing, nausea, vomiting, epigastric distress, giddiness, palpitations, sweating and occasionally collapse.

The almost constant finding during and immediately after the first few injections of this drug has been a marked fall of blood pressure, both systolic and diastolic, the former to a greater extent than the latter. A drop of 20 to 40 mm. of mercury within a minute or two of the injection has been found in all cases showing the more severe symptoms, and the drop has been even greater in the patients who collapsed. The blood pressure rises to nearly the previous level in almost all cases within 5 to 10 minutes and with this rise most of the symptoms disappear. In the cases in which there are serious reactions, an injection of adrenalin raises the blood pressure almost immediately and the unpleasant symptoms subside. When in such cases an injection of adrenalin is given a few minutes before an injection, little or no fall of blood pressure takes place and the symptoms may be entirely absent.

The symptoms—giddiness, faintness, palpitations, sweating, epigastric distress and collapse—can be readily explained in most cases by this fall of blood pressure that results from the injection. If we regard the drug as having a histamine-like effect, the sudden fall of blood pressure and the symptoms associated with it, the flushing of the face, the hot sensation, the occasional burning sensation in the different parts of the body, and the dyspnœa can all be explained. The fact that adrenalin relieves these symptoms, also supports this point of view.

It was very rarely that the patient did not complain of some slightly unpleasant feeling which scarcely amounted to a reaction; a 'slight reaction' in the table means at least severe flushing and headache.

In 25 cases there was a severe reaction.

The following is a good example of a case in which a severe reaction occurred:—

Case 94.—The patient had been suffering from kala-azar for 9 months; weight 77 lb. The injections were commenced on the 10th September, 1941. The first dose of 0.025 gm. did not cause any marked reaction. The second dose 0.05 gm. gave rise to severe reaction; she collapsed, had convulsive twitchings, the pulse was imperceptible, she became cold and clammy, the blood pressure fell from 112/84 to 50/16 (?). The heart rate became very slow. The patient was given 1 c.cm. of adrenalin hypodermically and artificial respiration. She rallied after 2 minutes. The rest of the injections were preceded by 0.25 c.cm. of adrenalin hypodermically and reactions were entirely absent with these injections. The patient had 10 injections—maximum 0.08 g. and the total dose was 0.625 gm.—and she was later discharged cured.

The dose which first caused the severe reaction was the second and it amounted to 0.65 mgm. per pound; subsequently, with the help of a very small dose of adrenalin she tolerated a maximum dose of over 1 mgm. per pound quite easily.

This was not the worst reaction that we experienced; this reaction occurred in an out-patient who was being treated for oriental sore. He received 0.05 g. (or 0.3 mgm. per pound) and became unconscious with loss of reflexes (*vide* Napier and Sen, *loc. cit.*).

The following case demonstrates how adrenalin given after the injection controls the reaction,

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but given before, in very small doses, prevents them, and how eventually tolerance is established.

Case 44. *A male Indian, weight* 93 *lb.*

Date	Dose of diamidino stilbene	Systolic B.P.			Diastolic B.P.			Reactions and precautions
		Before	After	Difference	Before	After	Difference	
26-6-41	0.05	94	82	— 12	60	56	— 4	Slight reaction.
27-6-41	0.075	94	64	— 30	60	32	— 28	Severe reaction, faintness, feeble pulse, burning sensation all over the body. Adrenalin 0.25 c.cm. given with relief.
28-6-41	0.08	100	112	+ 2	68	70	+ 2	Adrenalin 1 c.cm. given *before* injection of diamidino stilbene. No reaction.
29-6-41	0.09	106	108	+ 2	70	76	+ 6	Adrenalin 0.33 c.cm. given *before*. No reaction.
1-7-41	0.10	108	90	— 18	76	45	— 31	Reaction—Adrenalin 0.33 c.cm. given *after* injection of diamidino stilbene—with relief.
2-7-41	0.10	92	90	— 2	66	66	0	Adrenalin 0.33 c.cm. given *before*. No reaction.
3-7-41	0.10	—	—	—	—	—	—	Slight reaction. Adrenalin not required.
4-7-41	0.10	—	—	—	—	—	—	Ditto.

Case 30 is another case in which tolerance was established. In this case we were testing the value of atropine which we subsequently concluded had little or no effect on the reaction.

Case 30.—The patient had been suffering from kala-azar for about a year; weight 87 lb. Immediately after admission he developed pneumonia and was successfully treated with sulphapyridine. He was given 0.025 gm. of diamidino stilbene on the first day of the course of treatment for kala-azar. He had a very severe reaction, burning sensation all over the body, faintness, dyspnœa, sweating and palpitations. There was a marked fall of blood pressure and the pulse became very rapid (160/min.) and feeble. The symptoms subsided in 5 to 7 minutes and the blood pressure gradually rose. There was less reaction with the second injection, but the pulse became rapid and was soft. He was given an injection of atropine before the injection of diamidino stilbene, but this did not stop the fall of B.P. The severity of the reactions was much less at this time, and it progressively grew less, though no atropine nor any other drug was given. He was repeatedly given the full single dose for his weight (0.09 gm.) without any appreciable reaction towards the end of his course of treatment.

In 54 additional cases the reaction was noted as 'slight'.

Blood pressure.—The blood pressure, in those cases in which it was taken, appeared to be more or less parallel to the subjective symptoms. After a standard dosage was adopted, we took blood pressure readings in all cases for a time. These are shown in tabular form in protocol II. It will be noted that there was apparently a progressive fall in the initial blood pressure (*see* figure 1). The fall after the second administration of the diamidino stilbene was less, though the dose was increased. After a further increase in dose it appeared to be greater again; but later, when the dose was stabilized, the fall became progressively less; this was only followed in a few cases, but can be deduced from the decrease in the reaction symptoms.

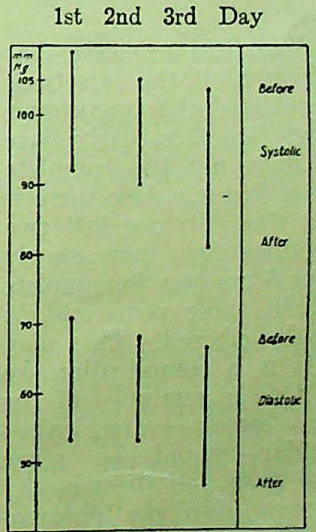

Fig. 1.—Showing systolic and diastolic pressures, before and after diamidino stilbene injections; mean of readings of 24 patients on three successive days.

Control of reactions.—These reactions were obviously a serious complication to the administration of this drug and the problem of obviating them was important. We used adrenalin from the beginning to control the symptoms (Napier and Sen, *loc. cit.*) Wingfield (*loc. cit.*), apparently having overlooked our

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earlier communication, suggests the use of adrenalin on the false (we believe) supposition that these symptoms are due to the fall of blood sugar. As early as 1937, Lourie and Yorke exploded the theory that the drugs of this group act by reducing blood sugar (in a communication that was apparently also overlooked by Wingfield). Napier and Sen (*loc. cit.*) were unable to show that diamidino stilbene had any hypoglycæmic properties in a case in which the blood sugar estimations were done, and recently we have confirmed this observation in two additional cases; the results are shown in the table:—

TABLE IX

Effect on the blood sugar

	Date	Blood sugar estimations on different days				
		Grammes per cent				
		13-2-42	17-2-42	18-2-42	19-2-42	20-2-42
	Amount of drug given at 10 a.m.	*nil**	0.025	0.050	0.075	0.090
Case *a.* Weight 88½ lb.	Before injection 10 a.m. ..	0.096	0.096	0.097	0.098	0.099
	½ hour after 10-30 a.m. ..	0.096	0.095	0.096	0.096	0.097
	1 hour after 11 a.m. ..	0.093	0.097	0.098	0.095	0.097
	1½ hour after 11-30 a.m. ..	0.095	0.096	0.097	0.098	0.096
Case *b.* Weight 93½ lb.	Before injection 10 a.m. ..	..	0.108	0.108	0.110	0.110
	½ hour after 10-30 a.m. ..	..	0.106	0.107	0.106	0.107
	1 hour after 11 a.m. ..	..	0.108	0.108	0.106	0.106
	1½ hour after 11-30 a.m. ..	..	0.108	0.106	0.107	0.108

* Control taken at same hours of day.

In this same paper, Wingfield suggests that the reactions can be obviated if the injections are given slowly. We realized the importance of giving injections slowly from an early date in our experience, but it is not the complete answer, nor even the main factor. Also there is possibly another side to this. In our last two cases, we gave the injections even more slowly than before, taking about 5 minutes to complete the injection. In one case, three veins and, in the other, one became thrombosed. This may be a coincidence, but it is a complication we had not noted before. One is reminded of the recommendation that certain arsenicals—mapharside in particular—should be given rapidly to prevent local pain and thrombosis.

On a preliminary report from the pharmacologists that the fall of blood pressure was partly vagal in origin, we tried the prior administration of atropine to control the reactions, but after a few trials we abandoned this method.

In the majority of cases, the establishment of tolerance by increasing the size of the doses very slowly seemed to us the only certain way of obviating the reactions, but even this was not certain, *vide* case 52 in which the reactions seemed to increase in intensity. Further, this procedure will prolong the course of treatment very considerably. Again, the worst reactions occurred in cases in which a comparatively small dose was given, whereas others have been given an initial dose relatively twice as great without any ill effects, so that it is obvious that the personal factor is an important one. We have noted that the worst cases, from the point of view of general condition, appear to stand the injections best.

We were compelled to turn again to adrenalin, but meanwhile we had found by experience that a very small dose was sufficient and that it was best to give it just before the other injections. We eventually adopted this procedure of giving a very small dose (0.025 g.) of diamidino stilbene for the first one, to test the patient's susceptibility, then increasing the doses fairly rapidly, giving 0.25 c.cm. of 1 in 1,000 adrenalin *before* the injection, in those cases in which there was any sensitivity to the first dose. Later, when tolerance was established, it was usually possible to dispense with the adrenalin.

Neurological sequel

In a previous paper, we (Napier and Sen Gupta, *loc. cit.*) reported certain interesting neurological symptoms that occurred in 4 cases. In postscript, we referred to 3 more that had come to our notice, and now we have information regarding 2 more, making 9 such cases in all.

The salient features of the above cases are: (1) Subjective disturbance of sensation over various parts of the trigeminal area, paræsthesia, anæsthesia, formication, and hyperæsthesia. (2) Loss of sensation of light touch over this area, with the preservation of sense of pressure and pain (dissociated anæsthesia). (3) No evidence of other neurological or any systemic disorder.

RESULTS OF TREATMENT

In two of the first few cases treated (cases 4 and 16), the progress was slow and a second

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course was given, possibly rather prematurely; otherwise, with one other exception, a single course only was given.

Clinical response.—In this series the *fever* usually continued until after the last injection (figures 2 and 3). If the patient was in an afebrile phase, or if the temperature fell early, it usually rose again after a few injections and was maintained as before until after the last injection (figure 4). Occasionally, it fell halfway through the course and remained normal (figure 5). At the end of the injections, the *leucocyte* count was usually distinctly increased, but the *weight* often showed a decrease and the spleen usually remained about the same.

Fig. 2. Case 82.

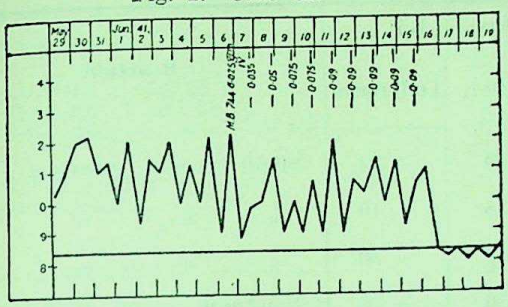


Fig. 3. Case 62.

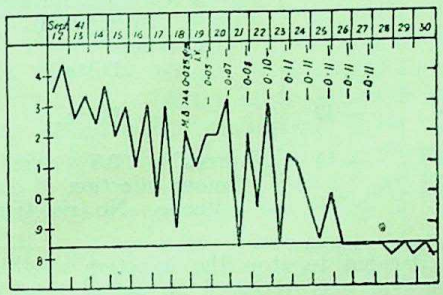


Fig. 4. Case 87.

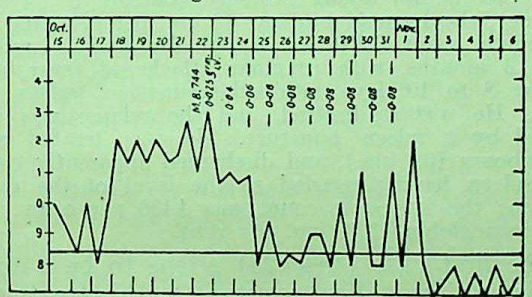
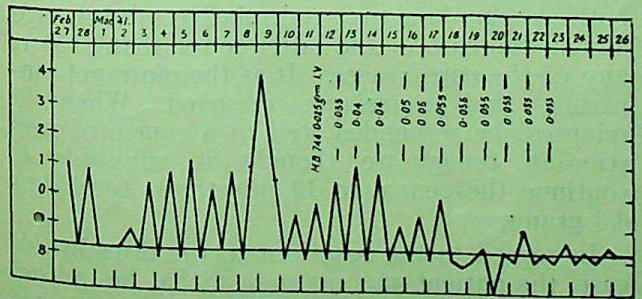
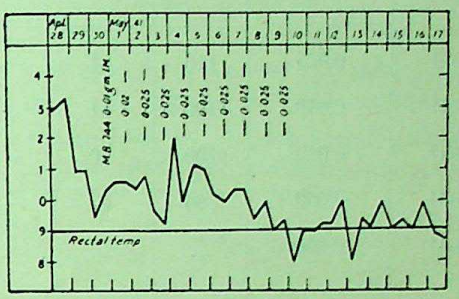


Fig. 5. Case 78.



Immediate cure rate.—Two patients died and 99 were discharged as cured. Of the latter, two returned and were shown to have relapsed. One of the relapsing patients was again treated by diamidino stilbene and was discharged again apparently cured; the second case did not return until after the supply of the drug was exhausted, and he was treated on this occasion with neostibosan.

Fig. 6. Case 34.



Deaths.—Further details are given about the two patients who died :—

Case 65.—The patient had been suffering from kala-azar for 2 years before she came to the hospital. She was in a miserable state, seriously anæmic with œdema all over, heart enlarged and rapid in rate. She was given diamidino stilbene intramuscularly. From the day of the third injection she developed severe dysentery and also a few purpuric patches over the body. She did not respond to treatment for dysentery and purpura, and died the next day.

Case 84.—The patient had been suffering from kala-azar for 3 months before admission. He had 5 injections of urea stibamine 2 months before and developed jaundice one month before admission. On admission he had severe jaundice, and purpuric hæmorrhages under the skin and dysentery. He was given 9 injections, total dose amounting to 0.625 gm. There was no improvement in the diarrhœa or in the fever. Three days after the course he complained of severe pains in the left inguinal region. He also had slight ascites. The next day he developed a big subcutaneous hæmorrhagic patch extending over almost the whole of the left side of the abdominal wall and he also had severe hæmorrhage from the gums, hæmatemesis, and melæna. Hæmostatics and vitamins K and C were given without success. He died the same day.

It will be seen that there were few points of similarity between these two cases and that none of the symptoms which developed were obviously associated with the drug. Nor are there any obvious links between the severe symptoms that appeared in many cases and the symptoms in these cases. They were both apparently severe cases of kala-azar that one encounters from time to time.

In one case death occurred early in, but not at the beginning of, treatment, and in the other some days after treatment was completed. In the latter case, the dosage—individual, total, and relative—was well below the average, and neither patient showed anything but mild symptoms during the administration of the drug. The white cell counts in both were very low, 2,100 and 1,150 per c.mm., but in one-third of the cured cases the leucocyte count was as low as the higher of these two.

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Final results of treatment.—If a relapse is going to occur, there is usually definite evidence of it within 4 months, and very rarely later than 6 months. In this series we have not had time to get into touch with all our patients, even if this were possible—for many live in villages many miles away—but we have either seen or received a clear statement as to the present condition of 35 patients. Of these 2 have relapsed and the remaining 33 are apparently completely cured. Of the relapsing patients, one, a very resistant case, came again to see us on account of fever, and the other reported a return of symptoms by post and was readmitted at our request.

We have found in the past that a very large percentage of our patients return for treatment if they have relapsed, so it is probable that the vast majority of the rest were completely cured.

Relapses.—Short case notes are given on the two patients in which a relapse occurred :—

Case 28.—The patient had been suffering from kala-azar for 1½ years. She was very anæmic and emaciated and the spleen was enlarged 5½ inches below the costal margin. She had been treated with injections of neostibosan and urea stibamine and altogether 21 injections had been given without any marked effect on the disease. She was given a course of 15 injections of diamidino stilbene—total dose, 0.340 gm.; relative dose, 1.28 gm.—and was discharged apparently cured, the spleen measuring 1½ inches and the blood condition distinctly improved.

She had a relapse of fever 1½ months after discharge from the hospital and was readmitted. She was given two courses of injections of diamidino stilbene, 15 injections in the first and 12 injections in the second course, total dosage being 0.615 gm. She improved progressively and was afebrile for over 2 months before she was discharged, again apparently cured. The total dose for the three courses of injections was 0.955 gm.

Case 52.—The patient had been suffering from kala-azar one year before admission. He had no treatment before admission. He was given 3 injections of neostibosan—0.2, 0.3, and 0.3 gramme—on consecutive days, as in another case in which recent treatment with antimony had been given the temperature had come down quickly and this new modification of procedure was tried as an experiment. The injections were started two days after the last injection of neostibosan. The patient had a rather severe reaction with faintness and a feeble pulse from the fourth injection onwards. The dosage was reduced but he had to be given adrenalin after the seventh injection and again before the eighth injection. Details of the reactions to the injections are given below :—

Date	Dose in gm.	Systolic B.P.			Diastolic B.P.			Reaction
		Before	After	Difference	Before	After	Difference	
30-7-41	0.025	116	84	— 32	84	50	— 34	Slight burning sensation.
31-7-41	0.040	100	84	— 16	68	58	— 10	„ „ „
2-8-41	0.040	100	70	— 30	70	40	— 30	„ „ „
3-8-41	0.050	94	52	— 42	62	36	— 26	Faintness.
4-8-41	0.060	..	..	..	..	..	..	Severe reaction, faintness, feeble pulse. Adrenalin 0.5 c.c. given with relief.
5-8-41	0.070	..	..	..	..	..	..	Ditto.
6-8-41	0.050	100	50	— 50	72	30	— 42	Ditto.
7-8-41	0.050	92	100	+ 8	50	64	+ 14	Adrenalin 0.5 c.cm. given before injection of diamidino stilbene. No reaction.

It was decided to stop the injection at this stage, though he had only received an actual total dose of 0.385 gm. and a relative total dose of 0.40 gm., because of the reactions and the fact that he had had 3 injections of neostibosan too. Ten days after completion of treatment, he had an attack of dengue lasting for 5 days.

He was discharged apparently well on the way to recovery—spleen markedly reduced in size; he had been afebrile for about a month (barring 5 days of dengue), the hæmoglobin was 13 gm. per cent and the leucocyte count 3,250 per c.mm. He had a relapse after 3 months, with irregular attacks of fever, each lasting 8 to 10 days with enlargement of spleen and liver. He was readmitted, and the relapse was confirmed by a spleen puncture. He was treated with neostibosan (3.3 gm.), and discharged apparently cured, the spleen having receded to the level of the costal margin; the leucocyte count was 4,150 per c.mm. and the hæmoglobin 13.75 gm. per cent.

The first case (case 28) seems to be a truly 'resistant' case, also resistant to this treatment, as it proved to the previous antimony treatment. The relative dose received was well above the average. In the second case (case 52) the amount of treatment was far below the average, both as regards actual and relative total dosage, and in the case of the latter lower than that of any of the cured cases. It is therefore not surprising that a relapse occurred. When he relapsed, he responded well to a course of neostibosan, though we thought it advisable to continue the course to 12 injections; total dose 3.3 grammes.

In regard to the reactions to the drug in this case, the patient was unusual in that he did not develop any tolerance; in fact, the reactions became more severe, necessitating adrenalin, and we were thus encouraged to discontinue the treatment early, too early as it turned out.

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Clinical and blood picture improvement at time of discharge

Weight.—In 96 cases the weight on admission and at the time of discharge was recorded :—

Weight		Number of cases
Increase by—		
7 lb. or less	44	
Between 7 and 14 lb.	28	
Between 14 and 21 lb.	13	
Over 21 lb.	2	
	—	87
Weight remained the same		3
Weight reduced		6
		96

In some cases the weight dropped as much as 13 lb. (*e.g.*, case 2), as a result of fluid redistribution, before it began to rise again, so that, if the patient was discharged early, little or no increase in weight was apparent. In the 6 cases in which there was a decrease in weight this was apparently what happened, as 4 of them were known to be well 4 months after discharge. Both relapsing cases, on the other hand, showed an increase in weight.

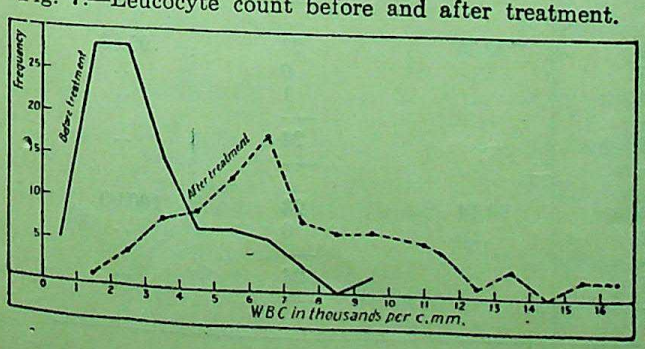
Size of the spleen.—The large majority of spleens were from 3 to 6 inches below the costal margin on admission. On discharge these were as follows:—

Spleen	Number of cases
Not below the costal margin	41
Palpable, or replaceable	16
Palpable but less than 3 inches below the costal margin.	40
Between 3 and 6 inches below the costal margin.	2
Over 6 inches below the costal margin ..	2

The correlation between the size of the spleen and cure is not complete; for example, of the 4 cases in which the spleen was still over 3 inches below the costal margin, three were known to have been well four months after the course was complete and the fourth patient has not reported sick again. On the other hand, in both the relapsing cases the spleen was markedly reduced.

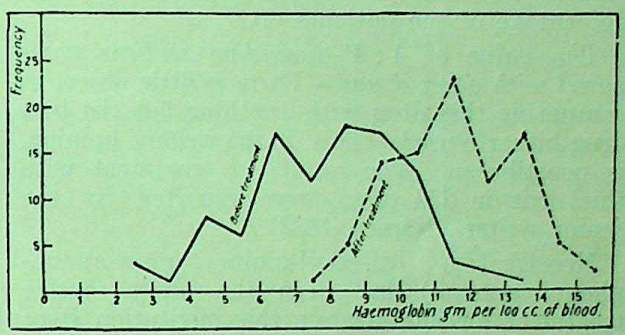
The white cell count.—The counts at the time of discharge are shown in table V, also graphically in figure 7. It will be seen that in only 13 patients was the count below 4,000 per c.mm.; of these, in 9 the count had been very low at the beginning and had more than doubled at the time the final count was taken; the remaining 4 cases consisted of one patient who relapsed, one was discharged immediately after treatment and has subsequently been reported to be progressing well, and the other two otherwise did well and are believed to have been cured. In the other relapsing case the leucocyte count increased from 3,750 to 5,500 per c.mm.

Fig. 7.—Leucocyte count before and after treatment.



Hæmoglobin percentage.—The final hæmoglobin percentage is shown in table III also graphically in figure 8. The mean of the

Fig. 8.—Hæmoglobin gm. per 100 c.cm. of blood before and after treatment.



counts is 12.00 ± 1.76 grammes per 100 c.mm. of blood. This amounts to an all-round increase of 50 per cent on the counts before treatment. Some counts were still low but none were below 7 grammes whereas 35 were below this figure on admission. The two relapsing cases had final hæmoglobin percentages just above and just below the mean respectively.

Discussion

Criteria of cure.—There appears to be no immediate *criterion* of cure in this disease and time alone will indicate if an apparent cure is a complete cure. The subject has frequently been discussed by the senior writer in the past (Napier, 1926–32 and Napier *et al.*, 1937). It was found that parasitological evidence is no more reliable than clinical. In a large percentage of the cases reported in this series a sternal puncture was done before discharge; in every case a negative result was obtained, though in two cases a relapse occurred later.

We have on past experience adopted as a rough guide for indicating cure that within a few days of the completion of treatment (*a*) the temperature should be normal and remain normal; (*b*) the white cell count should show a distinct increase; and that within two weeks of the completion of treatment (*c*) the patient's weight should have begun to increase, and (*d*) the spleen should show an appreciable decrease. It will probably be some further weeks before the leucocyte count has reached to a point within the normal range, the weight has returned to normal and the spleen has receded below the costal margin.

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It will be seen that some of our cases did not fulfil these criteria, but yet were cured; on the other hand, one of the relapsing cases did fulfil them all and the other most of them.

We have found that about 95 per cent of cases that are going to relapse will do so within 4 months and practically all within 6 months. So we accept a case as finally cured if the patient is well and without symptoms at the end of six months.

A number of these patients fulfilled this requirement. The two relapsing patients returned for treatment after $1\frac{1}{2}$ and 3 months, respectively. Amongst those about which we have no information, there is every reason to believe that they would have returned for further treatment had they relapsed; a large percentage of the patients do.

The value of 4 : 4′*-diamidino stilbene compared with other drugs.*—There is little object in comparing this drug with anything but the best drug hitherto used. This, in the writers' opinion, is neostibosan. The results of treatment with this drug in 254 cases were reported by the senior writer (Napier, 1932).

Neostibosan (di-ethyl-amine para-amino-phenyl stibiate) has been the main routine treatment for kala-azar in this institution since that date, and though records have not been analysed the writers are convinced that there has been a steady deterioration in the results obtained during the last ten years. The drug is a definite compound and has, we believe, not undergone any change; our method of giving it is also unchanged, except that in recent years we have had so many relapses with the smaller total doses that we now give 12 injections as a routine. This 'resistance' is also in evidence when other antimony compounds are used.

We know that kala-azar as it occurs in the Sudan is far more resistant to any form of antimony treatment than is the disease as we see it here. There is no reason to believe that there has been any naturally resistant strain introduced into Bengal and Assam, but it does seem possible that as kala-azar has been treated very widely in these provinces with antimony compounds for over 20 years now, the local strains are acquiring a degree of antimony resistance.

It was out of the question to run a parallel series of cases treated with neostibosan and diamidino stilbene. Also perhaps it is fairer to compare the earlier and better results that we obtained with neostibosan than the present-day results; certainly it will be a severer test for the new drug.

We have extracted certain data from the paper referred to above (Napier, 1932) and have taken more-or-less parallel results from this present paper. These are shown side by side in a tabular statement below :—

TABLE X

Comparing diamidino stilbene and neostibosan

	Di-ethyl-amine para-amino-phenyl stibiate	Percentage cured	Diamidino stilbene	Percentage cured
Immediate results—				
Discharged cured	244	96.10	99	98.02
Failed to respond to treatment ..	4	..	0	..
Died during treatment	6	..	2	..
	254	..	101	..
Subsequent history—				
Cured	199	91.28	33	94.29
Died within six months of some other disease (?).	6	..	0	..
Relapsed	13	..	2	..
	218	..	35	..
Excluding 'resistant' cases—				
Cured	181	92.35	23	95.83
Died	5	..	0	..
Relapsed	10	..	1	..
	196	..	24	..
Excluding also short-treatment cases—				
Cured	163	93.14	23	100.00
Died or relapsed	12	..	0	..
	175	..	23	..

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A glance at this table will show that the results with diamidino stilbene compare very favourably with those obtained with neostibosan, whichever way the results are analysed, though the differences in the percentages are not significant statistically.

It should be noted that in no previously untreated cases in which our arbitrarily adopted 'full course' was given was there a relapse.

Resistant cases.—In the 25 resistant cases the results were extremely satisfactory as the total dose given was very little higher than in the ordinary cases, and, excluding the one patient who died, the immediate cure rate was 95.83 per cent and final cure rate 90.90 per cent; only one in 11 cases, whose subsequent history was known, relapsing.

The following table shows the previous treatment that they had had and the result of the current treatment :—

TABLE XI

Summary of resistant cases

Case number	Previous Treatment			Diamidino Stilbene	
	Previous drug given	Amount	Result	Total dosage	Result
4	Pentavalent antimonials ..	..	Little improvement	0.850 + 0.915 = 1.765 gm.	C.
15	Urea stibol	3 gm.	Do.	1.15 gm.	C.
	Urea-stibamine	2 gm.			
16	Neostibosan	16 injections	Do.	0.140 + 0.243 = 0.383 gm.	C.
18	Solustibosan	5 injections	Do.	0.275 gm.	C.
	Neostibosan	5 injections at least.			
24	Neostibosan	1 full course	Do.	1.57 gm.	C.
28	Neostibosan and urea-stibamine.	Total 21 injections.	Do.	0.340 gm.	Relapsed.
92	Diamidino stilbene ..	0.340 gm.	Relapse after 1½ months	0.315 + 0.305 = 0.620 gm.	C.
34	Urea-stibamine	2 injections	Little improvement	0.230 gm.	C.
	Neostibosan	4 injections			
36	Urea-stibamine	12 injections	Relief followed by relapse.	1.23 gm.	C.
	Do.	16 injections	Do.		
	Neostibosan	4 injections			
	Solustibosan	8 injections	Little improvement		
44	Urea-stibamine	15 injections	Relief with relapse after 1 year.	0.82 gm.	C.
	Do.	15 injections			
51	Pentavalent antimonials ..	40 injections	Little improvement	0.37 gm.	C.
55	Aminostiburea	2.7 gm.	Relief followed by relapse after 1 month.	1.05 gm.	C.
58	Neostibosan	2.3 gm.	Relief followed by relapse.	1.25 gm.	C.
	Do.	2.0 gm.	Little improvement	..	..
66	Do.	36 injections	Relief followed by relapse.	0.96 gm.	C.
	Novostiburea	4 injections	Little improvement	..	..
69	Neostibosan	1 course of injection.	Relapse after a month	1.36 gm.	C.
70	Antimonial (pentavalent ?)	5 injections	Little improvement	1.115 gm.	C.
72	Do. do. ..	7 injections	Do.	0.98 gm.	C.
73	Do. do. ..	25 injections	Do.	0.66 gm.	C.
75	Do. do. ..	9 injections	Do.	0.775 gm.	C.
78	Neostibosan	4 gm. in several courses of injections.	Do.	0.570 gm.	C.
84	Urea-stibamine	5 injections	Persistence of fever. Jaundice developed soon after.	0.625 gm.	Died.
85	Neostibosan	13 injections, 2.7 gm.	Relief followed by relapse.	0.730 gm.	C.
88	Urea-stibamine	1 course	Do.	1.015 gm.	C.
	Neostibosan	1 course	Little improvement	..	..
	Urea-stibamine	21 injections			
91	Antimonials (pentavalent ?)	15 injections	Do.	0.780 gm.	C.
98	Neostibene ..	18 injections in all	Relief followed by relapse.	1.25 gm.	C.
	Urea-stibamine ..				
	Neostibosan ..				
	Neostibosan	10 injections	Little improvement	..	..

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PROTOCOL

Serial number	1	2	3	4R	5	6	7	8	9	10
Race	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.
Age in years	3	25	20	18	25	18	28	6	32	5
Sex	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.
Weight in pounds ..	24	94/81	83	103/101	85	86	106/111	28	85	24
Duration in months ..	4	(12)	2½	18	(2)	(3)	½/1	(24)	12	6
Spleen, inches below cost. marg.	2	P.	3	7	3	3½	P/2	5½	4½	4
Aldehyde reaction ..	+	− ive	+	+++	+	+++	− ive	+++	+++	+++
Hæmoglobin gm. per 100 c.cm.	8.2	11.0	6.32	8.5	(11.0)	9.35	10.2	9.7	8.25	9.07
Mean corpuscular volume (c.μ)	84.2	..	..	..	92.6	..	..	..	..	..
Leucocytes per c.mm. in 10^3 ..	13.3	1.2	10.1	1.7	5.8	3.0	1.8	3.4	5.6	3.35
Diagnostic puncture—spleen ..	O.	..	+	+	..	..	+	..	..	..
sternum (or tibia) ..	+(t)	+	N.D.	+	+	+	Neg.	N.D.	+	+
Total dose M.&B. 744, grammes	0.181	0.770	0.59	+ 0.850 + 0.915	0.810	0.740	0.910	0.126	0.65	0.21
Total dose per 100 pounds body-weight, g.	0.754	0.950	0.711	0.825 + 0.866	0.931	0.860	0.821	0.450	0.76	0.85
Maximum individual dose, g.	0.025	0.080	0.075	0.100	0.100	0.080	0.110	0.020	0.1	0.03
Number of doses	10	12	10	12 + 10	10	12	10	8	10	10
Reaction, slight	+	−	−	+	+	−	−	+	−	+
Reaction, severe	−	+	+	−	−	+	+	−	+	−
Final sternum puncture ..	Neg.	N.D.	Neg.*	+*	Neg.	Neg.	Neg.	N.D.	Neg.	N.D.
No. of days after last injection	60	..	..	11	18	33	30	..	21	..
Final hæmoglobin, g. ..	10.7	9.6	9.76	12.37	14.02	13.7	..	..	11.7	11.3
Final leucocyte count ..	10.1	5.3	9.9	3.7	8.2	8.1	6.9	..	10.9	15.8
Final spleen, inches ..	O.	O.	O.	3	O.	O.	O.	O.	P.	P.
Final weight, lb.	31	81	90	118	96	93	122	..	101	33
Immediate result ..	C.	C.	C.	C.	C.	C.	C.	C.	C.	C.
Subsequent history ..	..	..	..	..	C.	..	..	C.	..	C.

PROTOCOL

Serial number	24R	25	26	27	28R.	29	30	31	32	33
Race	E.	Ind.	Ind.	Ind.	Ind.	Ind.	A.-I.	Ind.	Ind.	Ind.
Age in years	40	15	40	24	7	8	23	12	20	15
Sex	M.	M.	M.	M.	F.	M.	M.	M.	M.	M.
Weight in pounds ..	168	74	120	99	26	52	87	64	74	85
Duration in months ..	8	2	3	2	18	3	12	(1)	3	3
Spleen, inches below cost. marg.	8	3	3	5	5½	3	6	4½	3½	3
Aldehyde reaction ..	+++	(+)	+++	++	+++	++	++	++	+	(+)
Hæmoglobin gm. per 100 c.cm.	7.9	7.5	5.08	6.3	2.75	9.07	6.3	7.15	11.13	8.52
Mean corpuscular volume (c.μ)	90.0	97.9	123.3	98.2	88.5	87.2	88.1	75.5	92.2	102.3
Leucocytes per c.mm. in 10^3 ..	3.75	2.85	4.3	1.3	3.75	3.75	1.40	0.7	2.7	2.8
Diagnostic puncture—spleen ..	+	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	+	Culture +	N.D.
sternum (or tibia) ..	N.D.	+	+	+	+	+	+	+	Neg.	+
Total dose M.&B. 744, grammes	1.57	0.71	0.585	0.82	0.34	0.49	0.7	0.565	0.655	0.875 (I.M.)
Total dose per 100 pounds body-weight, g.	0.934	0.953	0.487	0.826	1.283	0.933	0.804	0.879	0.879	1.020
Maximum individual dose, g.	0.18	0.08	0.11	0.1	0.03	0.055	0.9	0.065	0.075	0.1
Number of doses	15	10	6+6	10	15	10	10	10	10	10
Reaction, slight	+	+	−	+	−	+	−	+	+	−
Reaction, severe	−	−	+	−	+	−	++	−	−	+
Final sternum puncture ..	N.D.	Neg.	Neg.	N.D.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
No. of days after last injection	..	21	60	..	30	14	20	15	23	*26
Final hæmoglobin, g. ..	9.7	14.4	11.6	9.9	9.76	11.41	11.0	9.62	14.3	13.06
Final leucocyte count ..	4.3	7.6	5.4	1.7	6.7	8.9	5.5	4.0	7.9	13.2
Final spleen, inches ..	6½	O.	O.	3	1½	P.	1½	3	½	2
Final weight, lb.	170	94	147	100	34	56	94	71	81	87
Immediate result ..	C.	C.	C.	C.	C.	C.	C.	C.	C.	C.
Subsequent history ..	C.N.	..	C.	..	R. Case 92	C.	..	..	..	..

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I

11	12	13	14	15R	16R	17	18R	19	20	21	22	23
Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	A.-I.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.
5	26	5	14	33	5	14	3	26	32	5	5	10
M.	M.	M.	M.	M.	M.	F.	M.	M.	M.	M.	M.	M.
30	89	30	78	88	30	78	25	89	84	30	26	38
5/4	12	8	6/4	6	18	(16/30)	10	12	12	1	6	2
1½	7	6	3	4½	7	3	6½	7	6½	1½	4	1
(−)	+++	+++	+	+++	+++	(+)	++	+++	+++	(−)	+++	(+)
8.9	8.8	4.2	9.07	10.31	4.2	7.07	8.6	8.8	8.5	8.9	9.07	6.3
..	..	..	..	91.6	124.0	84.4	66.1	84.9	77.1	73.5	85.5	96.0
5.7	2.35	3.7	6.3	2.2	3.7	6.3	5.2	2.35	7.8	5.7	3.35	3.0
..	..	..	..	N.D.	+	N.D.	+	N.D.	N.D.	N.D.	N.D.	N.D.
+	+	+	+	+	N.D.	+	N.D.	+	+	+	+	C.+
0.30	0.87	0.38	0.59	1.15	0.140 +0.243	0.58	0.275	0.84	0.65	0.275	0.210	0.38
0.98	0.97	1.25	0.75	1.296	0.466 0.810	0.738	1.1	0.944	0.766	0.916	0.807	1.0
0.03	0.1	0.035	0.66	0.1	0.025 0.035	0.065	0.025	0.1	0.1	0.03	0.03	0.05
12	12	18	12	15	8 + 10	12	12	12	10	12	10	10
..	..	+	..	+	2nd course O.	+	+	−	+	+	+	+
+	+	+	+	−	1st course +	..	−	+	..	..	..	..
N.D.	Neg.	N.D.	Neg.	Neg.	N.D.	Neg.	N.D.	Neg.	Neg.	N.D.	N.D.	N.D.
..	26	..	15	19	..	16	..	20	20	..	..	..
13.3	15.1	10.7	13.75	12.6	10.03	13.7	12.3	15.12	11.6	13.2	11.2	11.5
13.3	11.5	8.4	10.0	6.3	10.05	10.0	12.0	11.45	10.9	13.3	15.8	5.9
O.	P.	1	O.	O.	2	O.	2½	2	2½	O.	1	O.
34	99	36	88	95	36	88	29	99	101	34	33	47
C.	C.	C.	C.	C.	C.	C.	C.	C.	C.	C.	C.	C.
..	..	..	..	C.	..	C.	C.	C.	C.	..	C.	..

I—*contd.*

34R	35	36R	37	38	39	40	41	42	43	44R	45	46	47
Ind.	Ind.	Ind.	Ind.	A.-I.	Ind.	Ind.	Ind.	A.-I.	Ind.	Ind.	Ind.	Ind.	Ind.
2	3	40	24	26	4	28	4	25	21	41	12	22	3
M.	F.	M.	M.	M.	M.	M.	F.	M.	M.	M.	M.	F.	M.
18	19	85	71	114	26	86	21	80	75	93	50	63	22
9	12	18	4	(1)	22/30	3	4	3	(12)	3	8	6	18
3½	5	6½	4½	4	2	4½	2½	4½	½	4	5	3	2½
+++	+	+++	+	(+)	(+)	++	Neg.	+++	++	+++	+++	++	±
4.81	9.6	3.43	5.5	11.0	10.03	7.5	11.6	12.3	4.1	7.5	6.1	8.6	9.9
98.1	77.5	124.3	111.8	81.1	79.6	72.6	82.3	112.8	128.4	94.7	122.3	96.3	83.9
6.1	7.4	1.6	0.9	1.8	5.3	2.2	4.2	2.4	2.3	2.2	2.2	1.2	7.5
+	Neg.	+	+	N.D.	N.D.	N.D.	+	+	N.D.	N.D.	N.D.	+	+:
N.D.	N.D.	+	N.D.	+	+	+	N.D.	N.D.	+	+	+	N.D.	N.D.
0.230 (I.M.)	0.265	1.23	0.825	0.815	0.375	0.775	0.36	0.78	0.69	0.82	0.45	0.555	0.29
1.277	1.394	1.434	1.149	0.711	1.415	0.901	1.674	0.965	0.916	0.881	0.886	0.880	I.M. 1.274
0.025	0.025	0.09	0.075	0.12	0.04	0.09	0.04	0.09	0.08	0.1	0.05	0.06	0.03
10	12	15	12	10	10	10	10	10	10	10	10	10	10
+	+	..	−	−	−	−	−	−	−	−	−	−	+
−	−	−	−	+	−	−	−	−	−	+	−	−	−
N.D.	N.D.	Neg.	Neg.	Neg.	N.D.	Neg.	N.D.	N.D.	Neg.	Neg.	Neg.	Neg.	N.D.
..	..	15	19	17	..	17	..	..	20	30	16	30	..
9.6	12.23	8.38	10.5	12.5	11.96	13.3	11.6	..	10.4	12.7	10.3	10.1	11.68
11.1	9.1	4.2	3.6	6.4	10.6	6.7	16.4	..	8.5	6.6	7.2	6.04	12.1
1½	2½	3½	1½	2	O.	1½	1	..	O.	O.	3	1	½
20	22	94	84	122	31	98	30	..	102	109	64	74	26
C.	C.	C.	C.	C.	C.	C.	C.	C.	C.	C.	C.	C.	C.
..	..	C.	C.	C.	C.	..	C.	C.	..	..	C.	..	..

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PROTOCOL

Serial number	48	49	50	51R	52	53	54	55R	56
Race	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	A.-I.	E.
Age in years	5	29	14	9	25	28	18	37	15
Sex	M.	M.	M.	M.	M.	M.	M.	F.	M.
Weight in pounds ..	21	114	53	38	96	97	90	101	125
Duration in months ..	6	6	12	18	12	3	7	(2)	1
Spleen, inches below cost. marg.	2½	3½	4½	4½	4	4	3	7	5½
Aldehyde reaction ..	+++	+++	+++	++	+++	++	++	+++	(+)
Hæmoglobin gm. per 100 c.cm.	7.56	6.8	6.8	4.53	11.0	7.15	9.62	5.5	10.31
Mean corpuscular volume (c.μ)	83.7	133.1	125.6	118.4	73.4	104.8	85.2	105.5	82.8
Leucocytes per c.mm. in 10^3 ..	4.5	1.8	1.3	1.5	2.2	1.0	4.4	2.0	2.3
Diagnostic puncture—spleen ..	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
sternum (or tibia) ..	+	+	+	+	+	+	+	+	+
Total dose M.&B. 744, grammes	0.275 I.M.	0.775	0.535	0.37	0.385	0.85	0.685	1.05	0.955
Total dose per 100 pounds body-weight, g.	1.309	0.676	1.004	0.973	0.4	0.871	0.759	1.034	0.764
Maximum individual dose, g.	0.03	0.1	0.06	0.04	0.07	0.1	0.09	0.1	0.12
Number of doses	10	10	10	10	8 + Neostib. 3 inj.	10	10	12	10
Reaction, slight	+	—	—	—	+ last 2 inj.	—	—	—	—
Reaction, severe	—	+	—	—	—	+	+	—	—
Final sternum puncture ..	N.D.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	N.D.	N.D.
No. of days after last injection	..	24	44	43	46	30	28	..	..
Final hæmoglobin, g. ..	11.13	11.41	10.7	11.0	13.06	13.3	13.3	8.38	13.75
Final leucocyte count ..	9.3	6.0	5.2	11.0	3.2	6.1	8.3	5.4	7.6
Final spleen, inches ..	O.	O.	1	2½	P.	½	O.	2	P.
Final weight, lb.	26	134	61	44	98	108	96	104	124
Immediate result ..	C.	C.	C.	C.	C.	C.	C.	C.	C.
Subsequent history ..	..	C.	C.	..	R.	..	..	C.N.	C.N.

PROTOCOL

Serial number	70R	71	72R	73R	74	75R	76	77	78R
Race	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	A.-I.
Age in years	45	42	36	16	6	36	30	24	8
Sex	M.	M.	M.	M.	M.	M.	M.	M.	M.
Weight in pounds ..	118	74	94	78	22	99	78	95	52
Duration in months ..	6	1	5	24	4	18	5	18	5
Spleen, inches below cost. marg.	4	1½	5	8½	3	3	2½	7	5½
Aldehyde reaction ..	+++	±	+	+++	Neg.	++	+++	++	(+)
Hæmoglobin gm. per 100 c.cm.	9.625	11.8	10.86	7.97	9.625	12.51	10.58	8.93	5.5
Mean corpuscular volume (c.μ)	80.0	90.0	81.2	112.7	83.7	86.1	95.7	95.4	103.1
Leucocytes per c.mm. in 10^3 ..	3.6	2.0	2.1	2.8	6.7	3.0	3.15	2.0	1.7
Diagnostic puncture—spleen ..	N.D. +p.b.	N.D.	N.D.	N.D.	+	+	N.D.	N.D.	C.+
sternum (or tibia) ..	N.D.	+	+	+	N.D.	Neg.	+	+	Neg.
Total dose M.&B. 744, grammes	1.115	0.625	0.98	0.66	0.375	0.775	0.845	0.915	0.570
Total dose per 100 pounds body-weight, g.	0.938	0.841	1.034	0.838	1.666	0.782	1.073	0.958	1.096
Maximum individual dose, g.	0.12	0.075	0.10	0.09	0.035	0.10	0.080	0.10	0.055
Number of doses	12	10	12	12	12	10	12	12	12
Reaction, slight	+	+	+	+	+	+	+	+	+
Reaction, severe	—	—	—	—	—	—	—	—	—
Final sternum puncture ..	Neg.	Neg.	Neg.	Neg.*	N.D.	N.D.	Neg.	Neg.*	N.D.
No. of days after last injection	17	20	20	19	..	..	18	43	..
Final hæmoglobin, g. ..	11.689	13.06	11.96	9.21	11.68	13.06	13.75	11.0	12.65
Final leucocyte count ..	7.5	5.85	3.3	6.4	8.65	6.5	9.6	4.9	3.95
Final spleen, inches ..	O.	O.	1½	2½	P.	O.	O.	1½	O.
Final weight, lb.	126	85	97	98	33	106	94	112	52
Immediate result ..	C.	C.	C.	C.	C.	C.	C.	C.	C.
Subsequent history ..	..	..	..	..	..	..	..	..	..

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I—*contd.*

57	58R	59	60	61	62	63	64	65	66R	67	68	69R
Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	A.-I.	A.-I.
2	35	25	18	17	30	30	12	9	38	23	14	26
M.	M.	M.	M.	M.	M.	M.	M.	F.	M.	M.	F.	M.
22	113	85	79	89	110	100	42	46	119	69	86	111
5	8	15/30	(48)	8	3	6	(36)	(24)	7	12	(2/3)	(5)
2	8	2	8	4	2	5	4	1	9	3	6	6
±	++	+	+++	+++	±	+++	+++	+	+++	++	++	++
6.8	8.11	13.31	6.87	10.72	8.2	9.76	7.56	2.61	6.46	6.18	11.0	6.325
93.7	96.6	89.4	98.1	98.4	82.11	90.33	101.6	118.0	103.2	92.2	88.5	104.2
3.4	1.7	3.6	2.4	1.6	1.5	1.2	3.1	2.1	2.6	1.6	6.3	1.15
N.D.	N.D.	N.D.	N.D.	N.D.	+	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
+	+	+	+	+	N.D.	+	+	+	+	+	+	+
0.27	1.250	0.575	0.685	0.665	0.875	0.815	0.445	0.14	0.96	0.635	0.61	1.36
I.M. 1.227	1.101	0.674	0.867	0.743	0.791	0.815	1.059	0.301	0.803	0.917	0.705	1.225
0.03	0.11	0.08	0.08	0.09	0.11	0.1	0.05	0.05	0.12	0.07	0.08	0.11
10	15	10	10	10	10	10	10	4	10	10	10	15
+	—	1st 5 inj.	—	—	—	+	—	—	—	—	—	+
—	—	+ last 5 inj.	—	—	—	0	+	—	—	—	—	—
N.D.	N.D.	N.D.	N.D.	Neg.	N.D.	N.D.	N.D.	N.D.	Neg.	N.D.	N.D.	N.D.
..	..	..	..	35	..	..	..	..	33	..	..	..
10.03	14.43	14.16	10.31	12.37	14.8	11.96	..	..	11.5	8.8	12.37	8.662
10.0	5.6	7.9	7.0	6.7	7.7	5.6	..	..	..	4.6	5.8	2.4
O.	7	O.	2	6½	O.	1½	..	..	2	1	P.	2½
25	114	98	87	88	118	101	..	..	136	84	93	109
C.	C.	C.	C.	C.	C.	C.	..	Died	C.	C.	C.	C.
C.	C.N.	C.N.	..	..	C.	C.	..	..	C.	..	..	C.N.

I—*contd.*

79	80	81	82	83	84R	85R	86	87	88R	89	90	91R
A.-I.	Ind.	Ind.	Ind.	Ind.	A.-I.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.
12	34	36	25	15	32	13	10	40	41	20	25	28
F.	M.	M.	M.	F.	M.	M.	F.	M.	M.	M.	M.	M.
47	118	81	83	76	82	70	52	82	116	76	101	116
4	7 years + 18	20/30	18	8	3	7	12	30	17	12	4	30
4	5½	1½	5	2	3	4	6	1	6	6½	5¾	6
+	+	Neg.	+++	++	Neg.	+	+++	+++	++	+++	++	+++
9.07	9.9	8.25	6.325	9.48	10.31	5.63	6.73	6.18	8.66	10.725	6.6	6.46
74.2	94.8	100.0	87.9	88.2	75.6	88.8	100.0	86.9	98.3	94.11	81.5	108.3
2.1	1.35	0.65	1.1	2.6	1.15	1.8	1.45	3.35	2.55	4.7	1.5	0.9
N.D.	+	N.D.	N.D.	N.D.	N.D.	+	N.D.	N.D.	+	C.+	N.D.	+
+	Neg.	+	+	+	+	N.D.	+	+	N.D.	Neg.	+	Neg.
0.345	1.535	0.780	0.710	0.695	0.625	0.730	0.465	0.685	1.015	0.625	0.815	0.780
0.734	1.298	0.960	0.844	0.911	0.762	1.042	0.881	0.830	0.873	0.822	0.802	0.669
0.05	0.12	0.09	0.09	0.08	0.08	0.07	0.05	0.08	0.11	0.07	0.10	0.11
10	15	10	10	10	9	12	10	10	12	10	10	10
+	+	+	+	+	+	+	..	+	+	+	*Nil*	+
—	—	—	—	—	—	—	—	—	—	—	—	—
Neg.	Neg.	Neg.	..	..	..	..	..	..	..	..	..	..
27	18	20	..	..	..	..	..	..	..	..	..	..
11.687	14.02	11.6	10.312	10.86	9.62	8.93	11.687	(7.562)	12.65	11.0	..	10.31
7.3	4.55	2.2	3.95	6.35	3.4	7.4	5.2	5.0	6.4	11.30	..	4.15
P.	P.	O.	2	O.	..	2½	2½	O.	P.	P.	4	3
59	123	87	95	81	..	66	57	97	113	87	106	116
C.	C.	C.	C.	C.	D.	C.	C.	C.	C.	C.	C.	C.
..	C.N.	..	..	..	..	C.	..	..	..	C.N.	..	..

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PROTOCOL I—*concld.*

Serial number	92R	93	94	95	96	97	98R	99	100	101
Race	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	A.-I.	Ind.	Ind.	Ind.
Age in years	7	20	41	15	10	1	23	4	19	25
Sex	F.	M.	F.	M.	M.	F.	M.	M.	M.	M.
Weight in pounds	29	84	77	97	48	16	118	23	93	88
Duration in months	(24)	12	10	?	1	(12)	7	5	4	15
Spleen, inches below cost. marg.	5	4	3½	½	4	4	7	4½	3	6
Aldehyde reaction	++	+++	+++	+++	(+)	(±)	(+)	(+)	±	++
Hæmoglobin gm. per 100 c.cm.	3.025	4.81	8.25	7.15	8.25	4.95	9.63	5.2	7.56	4.812
Mean corpuscular volume (c.μ)	130.2	82.9	111.5	116.07	83.3	..	78.7	80.1	85.4	113.0
Leucocytes per c.mm. in 10^3 ..	2.3	2.8	5.45	4.4	4.2	4.0	2.5	6.6	0.85	2.1
Diagnostic puncture—spleen	+	+	N.D.	N.D.	N.D.	+	+	+	+	N.D.
sternum (or tibia)	Neg.	N.D.	+	+	+	N.D.	Neg.	N.D.	N.D.	+
Total dose M.&B. 744, grammes	0.315 0.305	0.685	0.625	0.635	0.435	0.19	1.25	0.220	0.685	0.690
Total dose per 100 pounds body-weight, g.	01.067 0.953	0.813	0.803	0.652	0.901	1.187	1.059	0.936	0.732	0.779
Maximum individual dose, g.	0.03 0.035	0.08	0.08	0.09	0.05	0.02	0.10	0.025	0.09	0.09
Number of doses	15/12	10	10	9	10	10	15	10	9	9
Reaction, slight	+	—	—	+	+	*Nil*	+	+	+	+
Reaction, severe	—	—	+	—	—	—	—	—	—	—
Final sternum puncture	..	..	..	..	..	..	Neg.	..	..	..
No. of days after last injection	..	..	..	..	..	..	31	..	..	..
Final hæmoglobin, g.	9.62	9.12	11.13	..	9.07	11.68	13.75	12.23	12.375	11.68
Final leucocyte count	4.0	3.5	6.25	..	6.6	16.2	6.5	6.7	3.05	4.75
Final spleen, inches	2	P.	O.	P.	P.	½	½	1	P.	P.
Final weight, lb.	35	97	77	102	53	18	123	31	96	91
Immediate result	C.	C.	C.	C.	C.	C.	C.	C.	C.	C.
Subsequent history	..	..	..	..	..	..	..	..	..	..

R. = 'Resistant' case. E. = European. A.-I. = Anglo-Indian. Ind. = Indian. N.D. = Not done. P. = Just palpable. O. = Not palpable. Weight: Second weight is before treatment. Duration: Brackets indicate history questionable. Hæmoglobin: Brackets indicate counts during treatment. + p.b. = Leishmania present in peripheral blood. *In final puncture = Spleen puncture. C. = Discharged as cured, or finally reported cured. N. = Developed neuropathy later. R. = Relapsed. M. & B. 744 = Diamidino stilbene.

The treatment in other leishmanial infections

The drug has been used in four cases of oriental sore; the first two only had single injections as they were out-patients and did not return after the first severe reaction that they suffered. In the other cases a full course was given, but neither patient showed much improvement.

In two cases of post-kala-azar dermal leishmaniasis, a full course was given without any perceptible improvement in the dermal lesions being apparent.

Summary

4 : 4′-diamidino stilbene has been used in the treatment of Indian kala-azar in 100 patients, of ages from under one year to over 45, mostly Indians, at all stages of the disease, in about half the disease being over 6 months' duration.

The diagnosis was confirmed in all but two typical cases by demonstrating the parasite by spleen, sternum, or tibia puncture, and if necessary culture of the material. Our findings indicated that spleen puncture was the most reliable method. The aldehyde test was positive in 74 out of 100 cases.

The mean hæmoglobin percentage was 7.96 ± 2.26 grammes per 100 c.cm., the mean of the mean corpuscular volume was 94.1 ± 15.2 cu. μ, and the mean leucocyte count 3.470 ± 2.150 thousands per c.cm.; in 33 cases the leucocyte count was below 2,000 and in 76 below 4,000 per c.mm.

The drug was given intravenously in a 1 per cent solution in distilled water, in all but 5 cases in which it was given intramuscularly. It was very painful by the latter route. Injections were given daily.

In over 90 per cent of the previously untreated cases, either 10 or 12 injections were given; in the 'resistant' cases, sometimes up to 15 injections were given.

The scheme of dosage for adults finally adopted was an initial dose of 0.025 g., followed by doses of 0.050, 0.060 to 0.075 according to the reaction, 0.090 and 0.100 gramme, up to a maximum of about 1 mgm. (0.001 g.) per pound weight of patient; for small children the initial dose was 0.010 g. up to a slightly higher dose than 1 mgm. per lb., as children stood the drug better.

The mean total dose given in ordinary cases was 0.597 ± 0.245 g.; in 'resistant' cases it was 0.884 ± 0.414 g.

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PROTOCOL II

	1st dose—0.025 gm.						2nd dose—0.05 gm.						3rd dose—0.075 gm.					
	Systolic			Diastolic			Systolic			Diastolic			Systolic			Diastolic		
	Before	After	Difference	Before	After	Difference	Before	After	Difference	Before	After	Difference	Before	After	Difference	Before	After	Difference
1	110	96	14	70	56	14	118	100	18	78	60	18	126	84	42	82	30	52*
2	130	85	45	75	35	40	112	100	12	68	60	8	112	84	28	64	50	14
3	108	90	18	75	54	21	102	98	4	66	66	0	98	92	6	72	70	2
4	94	84	10	48	40	8	94	64	30	56	28	28	96	90	6	50	40	10
5	90	82	8	48	40	8	92	60	32	52	28	24	90	76	14	50	40	10
6	94	76	18	66	52	14	82	76	6	50	44	6	90	76	14	56	42	14
7	116	84	32	84	50	34	100	84	16	68	58	10	100	70	30	70	40	30
8	122	100	22	80	65	15	108	94	14	76	52	24	110	90	20	70	60	10
9	125	100	25	80	65	15	124	104	20	80	70	10	120	104	16	88	66	22
10	106	76	30	76	48	28	104	86	18	84	40	44	115	90	25	70	60	10
11	120	94	26	66	46	20	112	102	10	68	50	18	110	80	30	70	40	30
12	94	80	14	68	50	18	94	60	34	70	30	40	92	60	32	62	30	32*
13	118	100	18	80	70	10	118	100	18	70	62	8	112	80	32	76	42	34*
14	110	96	14	68	50	18	102	100	2	64	56	8	100	90	10	66	54	12
15	110	105	5	66	60	6	98	88	10	62	50	12	94	90	4	70	60	10
16	120	115	5	80	75	5	110	90	20	76	54	22	94	80	14	70	45	25
17	106	98	8	70	56	14	110	98	12	70	68	2	112	70	42	70	30	40*
18	98	98	0	70	70	0	102	94	8	66	58	8	94	90	4	60	60	0
19	100	65	35	70	20	50	100	82	18	70	50	20	108	65	43	68	50	18
20	112	82	30	62	52	10	120	90	30	70	50	20	110	82	28	60	50	10
21	108	102	6	70	70	0	98	98	0	64	64	0	94	76	18	64	44	20
22	100	90	10	70	58	12	110	102	8	68	65	3	110	90	20	65	50	15
23	112	102	10	80	70	10	96	88	8	65	65	0	104	60	44	68	20	48*
24	115	115	0	80	75	5	102	95	7	80	50	30	94	68	26	60	40	20
Mean	109.08	92.29	16.79	70.91	53.21	15.62	104.91	89.71	14.79	68.37	53.25	15.12	103.5	81.04	22.83	66.7	46.3	20.33
Sd.			11.4			11.8			9.2			12.01			12.4			13.3

The mean total relative dose per 100 lb. weight of patient was 0.912 ± 0.224 g.; in 'resistant' cases it was 1.009 ± 0.293 g.

The reactions that occur are troublesome and sometimes alarming but apparently not dangerous. They are almost the rule, about a quarter of the patients had severe reactions, another half mild reactions, and even the other quarter were not entirely free from unpleasant sensations.

The blood pressure nearly always shows a marked drop after the injections; sometimes this is very alarming.

The best method of controlling the reactions is by injecting 0.25 c.cm. of 1 in 1,000 adrenalin intramuscularly just before the injection of diamidino stilbene.

The immediate result of treatment was that 98 patients were cured and two died. Subsequently, two of the patients relapsed and one was treated a second time with this drug.

The clinical and hæmatological improvement in the treated cases is analysed. In only 13 cases was the white cell count below 4,000 per c.mm., against 76 before treatment. The hæmoglobin had increased by 50 per cent on the pre-treatment readings.

The criteria of cure are discussed.

Conclusions

With the introduction of 4 : 4′-diamidino stilbene a very great advance has been scored in the treatment of kala-azar.

The results of treatment with this drug in the ordinary case of Indian kala-azar compare very favourably with those produced by neostibosan, the best drug hitherto used.

The results obtained in the treatment in the antimony-resistant cases are almost as favourable as those in ordinary cases. This is a very important advance, as hitherto a considerable percentage of these patients have become discouraged after one or two relapses, and have returned to their homes to die.

Gramme for gramme diamidino stilbene appears to be at least four times as effective as neostibosan.

In an average mixed population, 60 grammes of diamidino stilbene should be sufficient to cure 100 patients and about 90 grammes to cure 100 patients of an average weight of 100 lb. each.

There is no evidence in our limited experience that the drug is of any value in the treatment of dermal and cutaneous leishmaniases.

Acknowledgment

Our thanks are due to Messrs. May & Baker for the generous supply of the drug with which

(*Concluded on next page*)

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FURTHER EXPERIENCES ON ENDEMIC TYPHUS IN MYSORE

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SINCE our first publication on this subject (Heilig and Naidu, 1941) was concluded, ten more cases of typhus have been observed here. As some facts have been found which made it easier to classify our 'Mysore typhus', in determining its rightful place on the chequered typhus map, these observations may be reported.

Fourteen cases of endemic typhus have been seen by us within sixteen months (November 1940 to end of February 1942). They showed a definite seasonal incidence: maximum in August with four cases; September, two; October to February one case per month; March to July no case.

Geographically.—Ten cases from Mysore City, four (cases 2, 3, 12, 13) from different large villages, situated at a distance of up to 40 miles from Mysore, within the city three patients (cases 5, 6, 7) who lived in two opposite houses and fell ill within one and the same week; in cases 1 and 10 and 11 and 14, respectively, the patients lived close to each other but each of these couples lived in different parts of the city. They fell ill at different times.

Age incidence.—Three to sixty years.

Sex distribution.—Six male adults, two boys, four female adults, two girls.

Community.—Twelve Hindus, two Mohammedans.

The clinical picture was so uniform in all these cases that further detailed case reports are not necessary. The onset was sudden, with malaise and a chilly feeling but invariably without a rigor, severe headache and in three cases pain all over the body, similar to those in dengue fever. *Fever* lasts for 16 to 21 days; the temperature is high from the beginning, usually remittent, between 100°F. in the morning and 102°F. to 104°F. in the late afternoon; at the end of the second week, it becomes intermittent and comes down to normal in a short lysis of two to three days' duration. No second rise was ever noticed when the temperature had once been normal for 24 hours. Figure 1 (case 11) shows a typical fever chart; figure 2 (case 14) one of a rare

Fig. 1. Case 11.

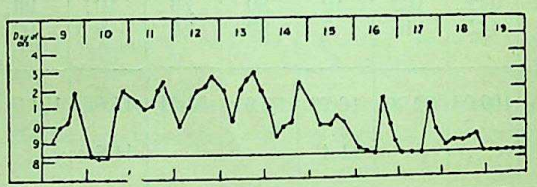
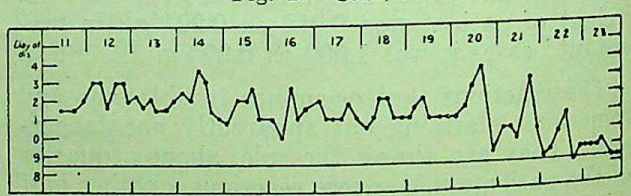


Fig. 2. Case. 14.



type: continuous fever for 18 days, which became suddenly intermittent for three days and subsided from the twenty-second day. *Pulse and respiration* rate are increased according to the temperature; no relative bradycardia was noticed. *Respiratory tract* infections are conspicuously absent; even in the severest case, characterized by 'typhoid state' or in elderly people, neither bronchitis nor the slightest sign of lung consolidation was present. The *tongue* is moist and coated in the milder, dry and brownish furred in the severe cases. *Conjunctivitis* was present from the beginning in all, but one or two cases, persisting sometimes longer than the fever. It gives the eyes a blood-shot appearance and sometimes causes burning sensation and watering of the eyes. *Liver and spleen* are hardly enlarged. The general and mental condition is mostly satisfactory, though the patients do not feel too well on account of the fever and headache; only in case 3, a Mohammedan lady of 50 was for about five days in a 'typhoid state'. Convalescence

(*Continued from previous page*)

this trial has been carried out. The drug is now marketed under the name 'Stilbamidine'.

REFERENCES.

ADAMS, A. R. D. (1941).	*Ann. Trop. Med. and Parasit.*, **35**, 53.
ADAMS, A. R. D., and YORKE, W. (1939).	*Ann. Trop. Med. and Parasit.*, **33**, 323.
Idem (1940).	*Ibid.*, **34**, 173.
ADLER, S., and RACHMILEWITZ, M. (1939).	*Ibid.*, **33**, 327.
BOWESMAN, C. (1940) ..	*Ibid.*, **34**, 217.
HARDING, R. D. (1940).	*Ibid.*, **34**, 101.
KIRK, R., and SATI, M. H. (1940).	*Ibid.*, **34**, 83.
Idem (1940*a*).	*Ibid.*, **34**, 181.
LOURIE, E. M., and YORKE, W. (1937).	*Ibid.*, **31**, 435.
MCLETCHIE, J. L. (1940).	*Ibid.*, **34**, 73.
NAPIER, L. E. (1926–32).	*Indian J. Med. Res.*, **14**, 263; **15**, 181; **16**, 141, 901, 911; **19**, 705, 719.
NAPIER, L. E., CHAUDHURI, R. N., and RAI CHAUDHURI, M. N. (1937).	*Indian Med. Gaz.*, **72**, 462.
NAPIER, L. E., and DAS GUPTA, C. R. (1936).	*Indian J. Med. Res.*, **23**, 973.
NAPIER, L. E., and SEN, G. N. (1940).	*Indian Med. Gaz.*, **75**, 720.
NAPIER, L. E., and SEN GUPTA, P. C. (1942).	*Ibid.*, **77**, 71.
WINGFIELD, A. L. (1941).	*Ann. Trop. Med. and Parasit.*, **35**, 55.

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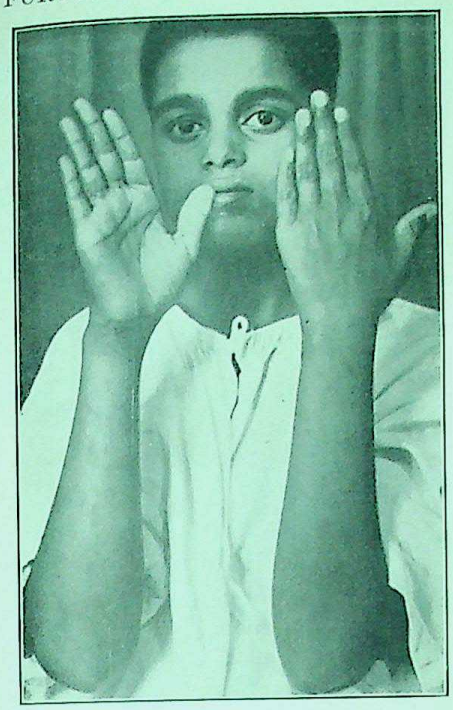

Fig. 3.

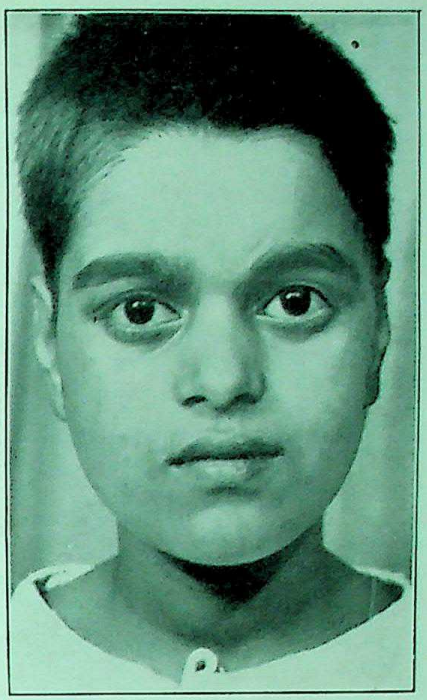

Fig. 4.

Case 10. 22nd day of disease. 15th day of rash.

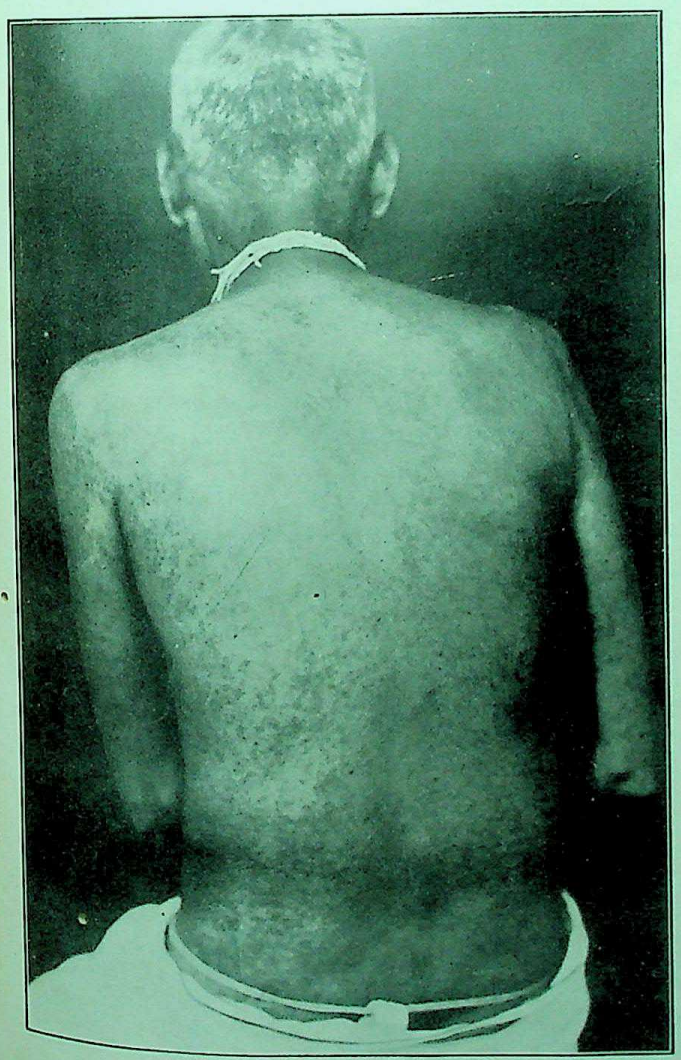

Fig. 5. Case 11.
17th day of disease. 8th day of rash.

Fig. 6. Case 13.
26th day of disease. 18th day of rash.

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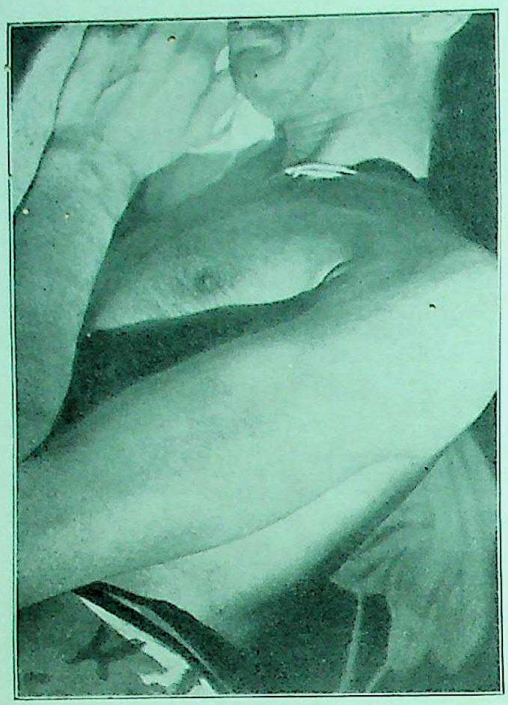

Fig. 7. Case 14.
11th day of disease. 2nd day of rash.

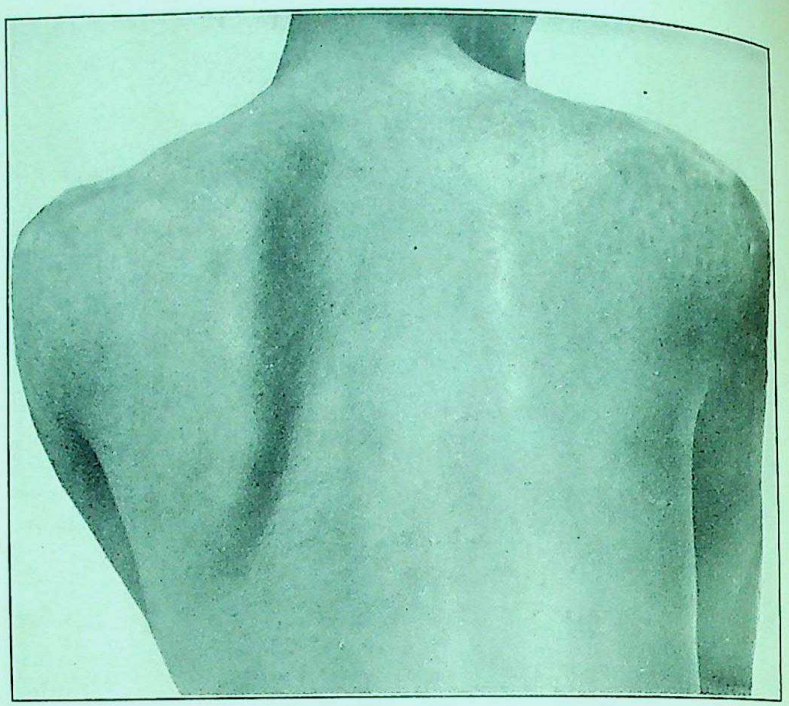

Fig. 8. Case 14.
15th day of disease. 6th day of rash.

Fig. 9.

Fig. 10.

Case 14. 29th day of disease. 20th day of rash.

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is short and uneventful, recovery speedy and complete.

The leading symptom in our cases is the maculo-papular *rash;* it was invariably present and appeared between the fifth and ninth or tenth day, rather later than earlier, though it might be difficult to recognize the very first stages. They are pinkish or purplish coloured macular spots fading on pressure, appearing first on the shoulders, the back and the ankles, spreading during the next five to six days downwards along the arms to the fingers and palms, upwards along the legs to the groins, showing finally the richest development on the fore-arms, the lower half of the shins, the wrists and ankles, in some cases also on the back. The gluteal region is usually densely spotted; chest and abdomen are the least affected; the face showed a few coloured spots on the cheeks and chin in four of these cases in the beginning, uncoloured papules in two of them towards the end of the second week. With the spreading of the rash, pinkish-purplish macular, similarly coloured maculo-papular and unstained papular efflorescences are present in the same area, becoming finally deeply stained and to a greater part petechial, at this stage not fading on pressure; all of them remain distinctly separated from each other. Towards the end of the third week the petechial efflorescences are transformed into brown pigmented spots of purely macular character. The photos of case 14 (plate XII) demonstrate the change from almost unstained papular to deeply pigmented macular spots on the fore-arms. During the fourth week peeling takes place to a variable extent, especially on the limbs, the palms and soles; the scales are minute and bran-like; the photo of case 13 (plate XI, figure 6) shows the peeling clearly on the arms. The stained spots remain distinctly visible for weeks and months; in fact they are—especially in the third and fourth week—more striking than the rash proper, though it is almost impossible to overlook the fully-developed rash, if the limbs are examined at all.

The *urine* did not show any pathological changes apart from an occasional febrile albuminuria, urobilinogenuria and a few erythro- or leucocytes. In case 13, *Escherichia coli,* in case 14 *Aerobacter ærogenes* was grown on culture; no special treatment was needed against these infections, which had no detectable influence on the course of the disease. The urine of six other cases out of these fourteen was found normal on microscopical and sterile on bacteriological examination. In none of these cases was *Proteus* found.

Apart from a slight constipation, no bowel troubles have been noticed. The examination of the motions showed nothing abnormal.

Leucocytosis of 12,000 to 20,000 with a normal differential picture is characteristic for Mysore typhus; the leucocyte count becomes almost normal soon after the fever subsides; a moderate eosinophilia was noticed during the peeling stage in some cases.

Widal for typhoid, paratyphoid A, B was negative in all cases.

Wassermann, or *Kahn,* or *Kling—reactions* have been examined in eleven cases and at least one of these reactions was positive in four cases during the fever, becoming negative soon afterwards.

Weil-Felix reaction was examined in eleven cases, not examined in cases 5, 6 and 7, because permission to draw blood was refused. These were being treated by private practitioners outside the hospital and were seen by one of us (H.).

The reaction was negative in cases 1 to 4, as reported previously, positive in cases 8 to 13, and almost negative again in case 14 on the 11th, 14th, 18th, 21st, 26th and 34th days (plate XII, figures 7 to 10).

The positive results are given in table I:—

TABLE I

Case number	Designation	Age	Day of disease	OX 19	OX K	OX 2	REMARKS
8	Mohammedan boy	3	12	1 : 40	1 : 40	1 : 320	
9	Hindu female	30	9	1 : 160	1 : 320	1 : 80	
	" "	30	21	1 : 320	1 : 320	1 : 80	
	" "	30	27	1 : 40	1 : 40	1 : 80	
10	Hindu boy	15	10	1 : 40	1 : 40	1 : 640	Plate XI, figures 3 and 4.
11	Brahmin adult	60	10	1 : 40	0	1 : 640	Plate XI, figure 5.
	" "	60	15	1 : 160	1 : 20	1 : 1,280	
	" "	60	22	1 : 160	1 : 40	1 : 160	
12	Hindu adult	38	9	1 : 80	1 : 20	1 : 160	Very mild case.
	" "	38	12	1 : 20	0	1 : 80	
13	" "	35	21	1 : 80	1 : 40	1 : 640	Plate XI, figure 6.
	" "	35	28	1 : 40	0	1 : 640	
	" "	35	35	0	0	0	

Neill-Mooser reaction.—This is determined by injecting the patient's blood into male guinea-pigs intra-peritoneally. Fever and scrotal swelling occur in the injected animals. Cases 4, 9,

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11, 13 and 14 have been examined in this way; only in case 4, reported previously, was the reaction highly positive. It is possible that the other patients came under observations too late to give this reaction; another explanation is that only the murine strains of Rickettsia easily and regularly produce a positive Neill-Mooser reaction and that the negative cases have been infected with another strain.

Rickettsiæ are demonstrable in the tunica vaginalis testis of guinea-pigs which show a positive Neill-Mooser reaction; accordingly they have been found in two guinea-pigs, injected with blood of case 4.

Epidemiology.—None of these patients was infested with lice or nits; none of them showed signs of mite-bite or remembered to have noticed any of them. All of them lived in extremely close contact with rats and most of them in equally close contact with cattle, which showed tick-infestation; but tick-bite was denied by all these 14 cases.

Some investigations have been conducted in an endeavour to find the vector. Two rats were trapped in the compound where case 5 lived; fleas, caught on them, have been emulsified and injected into guinea-pigs; they showed fever and their blood gave a Weil-Felix reaction up to 1 : 160 to OX 2, but the same examinations yielded negative results with rats trapped in the dwelling places of cases 9 and 14.

Ticks, recovered from cattle belonging to case 13 (19 ticks of different size) and case 14 (31 ticks of equal stage of development), have been crushed and the sterilized emulsion was injected into guinea-pigs; they did not develop any pathological reaction.

The suggestion set forward by Napier (Editorial, 1936) to trace the infection to other carriers such as dogs, which is in accord with experiences in fièvre boutonneuse (Marseille, Tunis), will be followed in subsequent investigations.

Differential diagnosis.—The fact that the Wassermann reaction is frequently positive among our hospital patients in general and in some of the typhus cases in particular would render the differentiation from a syphilitic rash difficult; the more so as syphilitic skin eruptions are frequently accompanied by continuous or remittent fever, and by headache and pains in the limbs. The subcuticular deeply-grounded appearance and dull-red colour of the maculo-roseolar syphilide resembles the typhus rash indeed; though it appears first on the flanks, it spreads soon to the limbs, rendering the diagnostic task still harder. In this stage, we rely on the absence of the syphilitic adenitis and the almost constant presence of a conjunctival hyperæmia in typhus, to aid in arriving at the right diagnosis, the history regarding a primary sore being unreliable in our patients. The further development of the rash easily clears up any doubt; whereas the syphilitic roseoles, especially on the neck, are followed by depigmentation (syphilitic leucoderma), the typhus efflorescences develop stained spots where they have been petechial. The differentiation from the later papular syphilide is easier; this is almost always localized along the margin of the hair and in the hairy scalp, set in rings on other parts of the face and accompanied by condylomata lata or moist papules and the typical *plaques muceuses* on the mucous membrane of the lips, the pillars of the fauces, etc.

The diagnosis has to be made, especially in children, from measles. Fever and conjunctivitis are to be found in both of them; but no bronchitis, and, of course, no Koplik's spots are present in our typhus cases; in measles the temperature comes down for a day or so before the rash appears, which takes place earlier (third to fourth day) than in Mysore typhus. As the rash appeared in some of our typhus children first on the face and was, in fair individuals, pinkish in colour, an early differentiation cannot be based on the rash alone. A reliable feature is the leucopenia in measles, the leucocytosis in typhus.

There is hardly any difficulty in excluding small-pox. Our typhus patients complained neither of severe pain in the back nor of vomiting; the small-pox eruption appears on the third day and is followed mostly by a definite drop of temperature; though in some of our cases uncoloured papules of a somewhat shotty feel were seen on the forehead and near the wrists; they appeared much later and the temperature remained uninfluenced.

Discussion

The diagnosis, being now confirmed by positive Weil-Felix reactions in six cases, is established beyond doubt. But the question is still open as to which typhus group the cases observed in Mysore belong.

Following Megaw's (1934) classification according to the vector, it may be said that our cases do not belong to two of his groups. On clinical, epidemiological and social-economical grounds the diagnosis of louse-typhus is most improbable; clinically, because in our cases the fever lasts longer, the rash appears later, is rarely and sparsely found on the face but profusely on the distal parts of the limbs; circulatory disturbances and vascular complications are absent; the prognosis is good, up to the present, without exception, and the recovery surprisingly quick. Not one of our Weil-Felix reactions is predominantly positive for OX 19. Only three of the fourteen infections occurred simultaneously in two opposite houses; only two of these three in one and the same family; it is definitely a non-epidemic disease. None of our patients belonged to the poor classes; all of them were well-to-do people used to personal cleanliness.

Apart from the classical tsutsugamushi or Japanese river fever, Queensland coastal fever,

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and mite fever of Sumatra, cases of mite-typhus have been found or suspected in Malaya ('scrub'-typhus), Burma, Assam (Woodhead and Dutta, 1941), Simla (XK type), and the Punjab; in fact where the Weil-Felix reaction was positive for XK only, the mite is most probably the vector. Mite-bite causes characteristic signs in many of these geographical varieties, but not in all of them; 'scrub'-typhus of Malaya shows neither infiltration nor ulceration on the site of the bite and no swelling of the regional glands is to be found. As, therefore, this sign is not reliable for the differentiation, a comparison with the clinical picture, described by Boyd (1935) for thirty-five cases, may further our purpose. The cases analysed by him originated from the Northern, Eastern and Southern Commands, except Poona-Ahmednagar area and Madras District; the seasonal incidence was confined to August-September; the rash was conspicuously inconstant in Indians (one among fourteen), was to be found on the trunk only and no staining was left behind. Weil-Felix reaction was positive for XK only; no co-agglutinins were present. Geographically, seasonally, clinically and serologically our cases are entirely different; there is no reason to assume that mites are the Mysore vectors.

Rat-flea typhus is found all over the world. American endemic typhus, Hone's disease of Australia, Toulon ship fever, 'shop'-typhus of Malaya, and the recently reported endemic typhus of Hawaii (Doolittle, 1941) are some of the best known clinical and geographical groups. Among Indian typhus, 27 cases, reported by Boyd from Bangalore and analysed by him (1935), have been recognized as 'Bangalore type' of rat-flea typhus in the '*League of Nations Report on Typhus Fever*' as early as 1936; it may be mentioned that the vector was not found actually in any case of 'Bangalore typhus' but Boyd suspected the rat flea on clinical grounds. As Sharma's (1940) 56 cases, observed in Bangalore, show exactly the same clinical and serological features as those described by Boyd previously, one is able to summarize the characteristic facts common to both these groups of Bangalore typhus in one clinical picture. Seasonal incidence throughout the year, maximal occurrence from March to July; onset sudden with a rigor; fever lasted for 10 to 14 days in Boyd's cases and up to 16 days in 48 (= 85 per cent) of Sharma's cases. The rash is extremely inconstant, only in a small minority of Indians present, quickly disappearing, without becoming petechial and therefore without development of pigmented spots. Respiratory complications are almost characteristic for Sharma's cases. Serologically, Bangalore typhus is an X 19 typhus; Sharma does not mention whether co-agglutinins have been present; they are regularly found in Boyd's series.

Compared with Mysore typhus, we find no similarity but only differences : during the seasonal maximal incidence in Bangalore (March to July), not a single case was observed in Mysore; constant appearance of a rigor there, never a rigor here, the absolutely constant rash in our cases, which lasts long and leaves stained spots behind which remain visible for months, the absence of respiratory complications form a picture, far different in every point from that observed in Bangalore. Finally, in none of our cases was a predominance of X 19 agglutinins noticed; the dominant strain in Mysore is X 2.

The clinical picture of rat-flea typhus, reported from all over the world, is similar to that seen in Bangalore and accordingly quite different from the Mysore syndrome; as, moreover X 19 agglutinins are predominant (though accompanied by co-agglutinins for the other strains) in most of the typhus groups of murine origin, it seems very probable that our cases belong to a different vector group.

It remains to be discussed whether our group shows any features in common with tick-typhus. Rocky mountain fever, fiévre boutonneuse (Marseille, Rome, Tunisia, etc.), Kenya fever, South African tick-bite fever (Transvaal, Rhodesia), and Indian tick-typhus are clinical entities, different from each other; practically the only point which they have in common is the presence of agglutinins for X 2 and co-agglutinins for both the other strains with such a variable titre for each of them that serologically this group is called 'the indefinite type; it is interesting in this connection that just in certain varieties of tick-typhus the Weil-Felix reaction was found negative for many years, like in rocky mountain fever and fiévre boutonneuse. A definite X 2-typhus is not recognized in the literature, but is to be found in Boyd's second group. Fourteen cases, observed in a limited area (Poona, Ahmednagar, Jubbulpore), showed a Weil-Felix reaction predominantly positive for X 2 and co-agglutinins constantly present, for X 19 and XK. Seasonal incidence and clinical picture of this group are very similar to those of our cases. Boyd gives the following descriptions: headache, suffusion of the conjunctivæ, body and joint pains, the rash constantly present with one single exception, especially profusely on the limbs, hands and feet, becoming always petechial and leaving stained spots behind. Respiratory complications were found in one case only; Wassermann reaction was strongly positive in two cases. Every single feature described as characteristic for this Deccan group fits perfectly to our own observations; even the peculiar fact that in one of these cases the rash was visible 'on the roof of the mouth', finds its counter-part in our case 11, where a well-marked enanthema was present on the soft palate. In fact, the similarity is so striking that at a time when we did not know anything about the serological character of our cases, our Weil-Felix reactions being negative, we pointed out the close resemblance between Boyd's X 2 group and our own cases (Heilig and Naidu, *loc. cit.*). The similarity becomes

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almost identical by comparing the serological facts in the Deccan and Mysore groups; in both of them and only in these two groups are the agglutinins predominant for Proteus X 2.

In none of these X 2 cases was the vector determined; though Boyd mentions their clinical relationship with Indian tick-typhus, he points out how very doubtful the case is against the tick as the vector in most of the cases collected and reported by Megaw and co-workers; he emphasizes 'that it is unwise to confine our suspicions and investigations to this one vector'.

The results of our efforts to trace the vector were almost negative. Neill-Mooser reaction, said to be regularly and easily obtained in all cases caused by murine strains, was positive only in one, negative in four cases. Rat fleas, emulsified and injected, caused fever and a positive Weil-Felix reaction in guinea-pigs only once and even then, only of a low titre. Ticks, picked from the cows kept in the compounds of two cases, did not produce any pathological reaction when injected into guinea-pigs. Investigations carried out on this line in Madras Presidency have been similarly disappointing (personal communication of B. P. B. Naidu). We agree with Boyd in saying that to solve the vector question in Indian typhus is an extremely complicated and puzzling task.

The fact that the Weil-Felix reaction was negative in five of our cases, in some of them, as in case 14, six times between the 11th and 34th day of the illness, tested with fresh antigens from Kasauli,* does not allow of any definite explanation. Our suspicion that a *Proteus* strain, different from X 19, XK and X 2, might be para-specific for these cases may be repeated.

Conclusion

The clinical, epidemiological and serological facts, characteristic for the typhus cases in Mysore, exclude them from the louse- and mite-typhus groups; they differ in every essential point from those observed in the Bangalore type, which is supposed to be a rat flea-typhus.

In every respect Mysore-typhus shows a definite similarity to Boyd's Indian X 2 typhus; the designation 'tick-typhus' is proved to be right only for a small minority of Indian typhus cases. It is doubtful whether ticks are the only vector of X 2 typhus.

Efforts to trace the vector of the Mysore type among rat fleas yielded mostly negative results; cattle ticks, investigated in two cases, did not produce any pathological effects in guinea-pigs.

The fact that the Weil-Felix reaction was positive in six and negative in five cases points towards the possibility of a Proteus strain different from the three tested ones being para-specific in the negative cases.

*The antigens used in case 14 from 1st February to 21st February, 1942, were obtained from Kasauli on the 24th December, 1941, and gave a highly positive Weil-Felix reaction in case 13, a few days before.

(*Concluded at foot of next column*)

THE DIAGNOSIS OF ACUTE APPENDICITIS

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ACUTE appendicitis and its complications are responsible for the death of thousands every year; in England and Wales it claims about 3,000, in the United States of America between 15,000 to 18,000 per annum. What the figures are for India, no man can tell, but despite the contention that vegetarian races are less liable to the disease than those races which eat large quantities of meat, there is no surgeon in India, who would fail to bear witness to the multitude of tragedies for which this disease is responsible.

We are often told that appendicitis is a disease of modern times—more accurately a disease relatively recently recognized. The removal of Edward VIII's appendix was regarded as a desperate procedure, not because the operation had never been done before, but because of the fact that the syndrome was not well recognized and the very diagnosis was in doubt. The position briefly was this, that a case of acute appendicitis, which recovered was diagnosed as a 'perityphlitis', but those who succumbed gained the unenviable distinction of dying of 'peritonitis'.

Despite the fact that nowadays everyone is on the look out for appendicitis, and that it has become the commonest cause of urgent cœliotomy, the mortality rates still waver between 2 to 6 per cent even under the best conditions, and the constant plea of operating surgeons is, for still earlier diagnosis, that is for a diagnosis of the disease when it is still acute appendicitis.

The appendix when diseased is not bound to any time table.

(*Continued from previous column*)

Summary

The epidemiological, clinical, and serological facts, observed in fourteen cases of typhus in Mysore, are described.

The differential diagnosis is discussed.

The clinical and serological features of the Mysore type are compared with those of louse, mite, rat flea, especially Bangalore typhus, and Indian X 2 typhus; the differences and similarities are discussed.

Attempts to trace the vector are reported; the difficulties connected with this problem are pointed out.

REFERENCES

BOYD, J. S. K. (1935) .. *J. Roy. Army Med. Corps*, **65**, 289, 361.
DOOLITTLE, S. E. (1941). *Ann. Intern. Med.*, **14**, 2091.
EDITORIAL (1936) .. *Indian Med. Gaz.*, **71**, 213.
HEILIG, R., and NAIDU, V. R. (1941). *Ibid.*, **76**, 705.
MEGAW, J. (1934) .. *Brit. Med. J.*, ii, 244.
SHARMA, L. R. (1940) .. *Indian Med. Gaz.*, **75**, 398.
WOODHEAD, L. S. F., and DUTTA, U. C. (1941). *Ibid.*, **76**, 406.

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To classify any appendix as early or late by the number of hours which have elapsed since the onset of symptoms is pure chicanery; those categories can only be applied when the appendix is seen through an abdominal incision.

On what grounds can an early diagnosis be established? Only by (*a*) an understanding of the pathology of the disease, and, based on this, (*b*) the establishment of a definite recognizable syndrome.

The essential point about the pathology of appendicitis is the recognition that it is obstructive in origin. Bowers states that 80 per cent are obstructive in origin, of which 67 per cent were due to an impacted fæcolith. Horsley gives 93 per cent as the figure in which the obstructive factor was definite. Personally, I would give pragmatic sanction to the statement that 100 per cent are obstructive in origin, simply because it frees one of the necessity to use terms like 'catarrhal appendicitis', which are a snare and a delusion.

Obstruction of the lumen whilst the mucosa is still viable produces a rise of intraluminary pressure which can mount higher than the arterial pressure of the supply to the organ and precipitate massive gangrene of the wall distal to the obstruction. The degree of completeness of the obstruction determines whether this factor of ischæmia rapidly produces gangrene or not. The appendix is more vulnerable to such a fate because its artery is an end-artery and no circulatory 'reinforcement' is possible. The relatively stout rigid muscular wall resists distension at the expense of the patency of its blood vessels, and thus further weakens the resistance of the organ to ischæmia as a result of distension. The whole of this process, as far as gangrene, can be accounted for simply on a mechanical basis without the assistance of infection. The reaction in the tissues surrounding the organ will therefore be minimal and the preconditions for localization of the infection, when the organ perforates, or permits infection by leakage through its gangrenous walls, will also be at a minimum. Sudden vascular death prohibits inflammatory changes in the wall except at those points where there is healthy tissue in physical continuity, *i.e.*, proximal to the obstruction or where adhesions have provided a collateral supply. At such places, zones or lines of demarcation develop and result in the sloughing off, of part or the whole, of the organ, providing a means of dissemination of the infective contents without the necessity of perforation; (paralleling stercoral ulceration and perforation in other parts of the gut).

When obstruction is less complete, infection can play a larger part, inflammatory processes not only fill the lumen with pus but produce intramural inflammation and inflammatory exudates, which by their action on contiguous tissues facilitate localization.

Pus is more easily localized than is the bloody fluid which issues from a gangrenous appendix, so that in these cases, where the inflammatory element plays a greater part, the possible consequences of delay may be less serious. Anticipating a little a later stage in the argument, one can here state that the ancillary methods of investigation—leucocyte counts, differential counts of any kind, sedimentation rates, etc.—can only be expected to give any positive information representing deviations from normal in those very cases which are least dangerous, for these investigations are only affected by the presence of inflammatory conditions which do not exist in the completely obstructed gangrenous appendix prior to perforation.

In brief, acute appendicitis is a closed loop intestinal obstruction, which may proceed to gangrene and rupture, and in which inflammatory processes may co-operate or become apparent only as sequelæ.

Pathologically, there is therefore a sound basis for assuming that a constant type of history can be expected, *i.e.*, symptoms and signs due to obstruction first, and then those due to inflammation.

The history of the attack of acute appendicitis

The diagnosis of acute appendicitis can be made more easily and certainly on the basis of history than of clinical signs.

The first most helpful description can be reduced to this mnemonic form. 'First and all the time—pain, next nausea, then tenderness, and finally fever with leucocytosis'. The late Sir D. P. D. Wilkie in his description of acute obstructive appendicitis emphasized that initially the pain was a colic, and that this was followed by localized tenderness in the right iliac fossa. Hamilton Bailey talks about the 'pointing test', indicating that the pain is recognized as being umbilical or supra-umbilical in situation initially, and then moves to the right iliac fossa.

In the above descriptions, the statement is made that the site of pain changes, but no emphasis is laid on the fact that the nature of the pain changes. The pain initially is that due to obstruction, *i.e.*, a colic, and then, in the natural course of the disease, follows the pain due to inflammation, which is far more accurately localized.

Few lay people can give a description of pain and to ask whether the pain initially was a colic is to expect the impossible.

One of the cardinal signs of inflammation is loss of function, or enforced rest. Movement enhances all the signs of inflammation including pain. By application of this fact one can attain to a solution of the problem of history.

The initial pain is a colic, unaffected by movement, makes patient restless and may be eased by pressure (*cf.* later). It is often very difficult to locate.

The second phase is the development of a 'sore pain' which makes him lie still, resent

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movement or pressure, and is further accurately localized by the patient, often, in the early stages, with the tip of one finger.

In the form of a catechism the elucidation of the history becomes something like this :—

Q. Has the pain been the same since it began ? *A.* No.

Q. Where was it in the beginning ? *A.* "All over the abdomen' or 'around the navel'.

Q. Did moving make it any worse? to which he may answer that he walked about or could not get comfortable in bed whichever way he lay, or that he tried to get his bowels moved but that the pain was not made worse by moving. But, when once the pain had moved to the right iliac fossa, he could not move suddenly, or cough, or sit up without making the pain worse.

This principle of differentiating between different pains is very valuable in differential diagnosis. Take, for example, a leaking duodenal ulcer which can produce all the physical signs of appendicitis without exception, with no spread of the tenderness and rigidity beyond the right iliac fossa. The onset may of course be more sudden, and there *may be* a very definite history of preceding dyspepsia, but unlike appendicitis the pain is one which enforces immobility from the beginning. This is also true of referred pleural pain in a right-sided basal pneumonia.

There is one important pitfall in the history which must be remembered. Reverting to the pathology of the condition for a moment—the pain which arises from the distension of the organ will be relieved, (*a*) if the obstruction is relieved or (*b*) if the sensitive tissues can no longer function, *e.g.*, when gangrene has occurred.

If the history suggests that, fairly quickly, or suddenly, the colic disappeared, there is every reason for regarding the incident with grave foreboding. Within half an hour of perforation or gangrene, there may be little or no tenderness in the right iliac fossa and of course no colic, but unless that patient is operated upon very shortly, 'RIP' may be written of that patient and not 'no tenderness in the RIF'. The patient may of course be fortunate and get a complete remission when an obstructing stercolith has been extruded through the ileo-cæcal valve.

Nausea and vomiting may or may not be present and may vary immensely in degree—usually however the patient does not vomit more than two or three times. To regard vomiting as an essential symptom and to wait for it until the patient had developed vomiting due to general peritonitis, is to court disaster. In the older patients, say, 55 to 60 and over, nausea and vomiting are uncommon.

Physical signs in the diagnosis of acute (early) appendicitis.

Fever is a very important sign, because it is not to be expected until after the diagnosis is made. Pain in the right iliac fossa, with fever from the beginning, is not appendicitis. In the older group of patients, fever at any stage is rare. The pulse rate may not be much affected before the development of complications. In young people it reacts more speedily, in old people may show very little change until general peritonitis develops.

Busch and Spivack say that in simple acute appendicitis 6 per cent have a pulse rate over 120 and even in gangrene with perforation only 30 per cent have a pulse rate over 120. It is perfectly reasonable to diagnose acute appendicitis when the pulse rate is still normal. With the development of complications an increase in the pulse rate and a fall in the blood pressure are to be expected. *Tenderness in the right iliac fossa* (RIF) is always present and is the only absolutely essential physical sign but the tenderness may be only slight. In early cases it may be found that localized pressure in the RIF produces an increase in the colicky pain, or a sickening pain in the centre of the abdomen when there is a still no definite painful spot in the RIF. The presence of this sign indicates an unperforated appendix and is reason enough for urging operation if the history points to the diagnosis. Occasionally, instead of maximum tenderness about McBurney's point, the maximum tenderness may be found close to the crest of the ileum towards the renal angle—in these cases the appendix is usually retro-cæcal.

Rigidity may not be present, especially if the appendix is retro-cæcal (complicating the fact that in these retro-cæcal cases tenderness also may not be very acute). In these cases the overlying cæcum on palpation gives a highly characteristic sensation. All are familiar with the labile 'squelchiness' of the ptosed and gas-filled cæcum (especially noticeable after an aperient has been given). In retro-cæcal appendicitis however this labile squelchiness is lost, and the cæcal wall feels as though it were filled with tiny gas bubbles, or as though the gas being displaced from the cæcum on pressure did so reluctantly through some adhesive fluid. The sign is difficult to describe but is characteristic enough once experienced.

Cutaneous hyperæsthesia either to pin prick or by Ligat's test always indicates a pathological process when present, and is sufficient with the history to occasion operation.

I would not be bold enough to assert, as some are inclined to do, that the presence of hyperæsthesia implies an unperforated appendix. In cases seen before the late stages it is early enough to make that statement when visual proof is available.

The absence of hyperæsthesia means nothing one way or another.

The result of rectal examination.—One might assert as a prelude that two-thirds of all appendices could not possibly be touched by the longest human index finger assuming that the patient relaxes to the utmost. When the patient

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is in pain, is apprehensive of all unorthodox approaches to the secrets of his abdominal cavity, and will not relax, one doubts if every pelvic appendix comes near enough to be touched by the examining finger. If there is pelvic peritonitis, however, rectal examination will always produce pain. It is perhaps necessary to mention that, in a patient suspected of having acute appendicitis, a tender object found in the pelvis by the examining finger is not necessarily the appendix and does certainly not clinch the diagnosis.

Zachary Cope's *obturator and psoas tests,* which seek to elicit pain on external rotation with the knee flexed, and on extension of the thigh, respectively, prove nothing except the presence of an inflammatory lesion near the fascial sheaths of the obturator internus or the psoas magnus. If the diagnosis of appendicitis has already been made on the history, then they are useful, with rectal examination, to indicate very roughly the position of the diseased appendix.

The rebound test.—The production of pain in the appendix area or at the umbilicus on pressure over the left colon should only be attempted in chronic cases.

(*N.B.*—No reference is made to signs of abscess formation or general peritonitis—the whole purpose of this paper is to argue for the certain diagnosis of the disease before these complications set in.)

The physical signs as outlined above merely indicate the presence of a lesion in the right iliac fossa and perhaps help to localize the lesion to a particular quadrant of the fossa. Laboratory investigations have no place in the diagnosis of early acute appendicitis and in the most severe complications of advanced disease may even then give very little help.

As has been explained above, the lesion which is potentially most serious (*i.e.,* the obstructive appendicitis with gangrene in which inflammation has played little or no part) is precisely the type of case in which there is no call made on the cellular protective mechanism, until the disease has passed beyond the stage of simple appendicitis. Take the other extreme—general peritonitis—an examination of blood at that stage on the first occasion might show a leucopenia or a count about normal and only a painstaking analysis of the leucocytes according to their maturity could possibly give an indication of the serious significance of the condition. On the other hand, the diagnosis having been made and action taken, serial examination of the white cells of the blood will give valuable information of that individual's reaction to the known gross pathology. But to let the diagnosis hang on a white cell count is entirely unsound, and yet it is a pseudo-scientific fallacy to which many are prone. If the diagnosis on the history is acute appendicitis, and fever is present (*e.g.,* in a case which is already late) what other evidence is required of the presence of an inflammatory reaction?

The recognition of verminous appendicitis may be a matter of largely academic interest, but it offers an explanation of some cases of appendicitis with severe symptoms which at operation show an apparently normal appendix, with a few threadworms or hookworms in the lumen. The feature of these is a history of repeated attacks, occasionally a history of worms in the stools, or the statement that ova have been found on examination may be given. Each attack begins with severe colic, marked localized tenderness in the RIF from the beginning of the attack, marked cutaneous hyperæsthesia, little or no rigidity, an early rise of temperature to 100–101°F., and a pulse rate reaching 100 fairly soon after the onset of the attack. This is described in order to be forgotten. The discovery of ova in the stools of a patient with suspected appendicitis should cause one to put a note on the case sheet that anthelmintics should be given during the period of convalescence after operation.

The application of this method of elucidation of the history to cases suspected of past attacks of appendicitis is perfectly sound, and, if a typical history is obtained, there need be no hesitation in deciding upon operation. *Radiological* investigation if carried out in order to confirm the diagnosis need concern itself only with (*i*) confirming the presence of stenosed portions in the appendicular lumen, or (*ii*) the presence of stercoliths which are of greater diameter than the rest of the appendicular lumen or (*iii*) of incomplete filling or emptying. Tenderness on direct palpation will only be present if the appendix is still inflamed. The presence of the mechanical factor is sufficient to indicate operation to avert the most dreaded form of the disease.

When a history of abdominal pain which on the above criteria is diagnosed as appendicitis and followed (*i*) by persistent tenderness in the right iliac fossa, (*ii*) by a constant unvarying dyspepsia without remissions, or (*iii*) by a premenstrual dysmenorrhœa, there is then no need to waste time and money on radiological examination.

Case notes

Two cases are now described which bear on points raised in the preceding paragraphs:—

The first is of a Khasi, aged 40 years, who very firmly adhered to this story that he had fallen off a high wall on to his buttocks nine days before, and that he then got pain in the abdomen, vomited, had diarrhœa, and had difficulty in micturition. He had no temperature and a leucocyte count of 6,000 per c.mm. On examination a hard mass was found on the right wall of the pelvis. On rectal examination this was about the size of a large orange, and seemed to be displacing the bladder upwards. He was so thin that the sub-assistant surgeon examined his sputum for tuberculosis, but this gave a negative result. The suggestion was obviously that we were dealing with a traumatic condition, but closer enquiry revealed, by the kind of

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catechism that I have described previously, that the pain in the abdomen was first colicky, then a sore pain which made him lie still. He vomited once after the onset of the colic, and had the diarrhœa after the pain had settled in the right side. The diagnosis of appendix abscess was therefore made, and this was confirmed, after a few days' conservative treatment, by laparotomy. It was ascertained that part of the abscess wall lay against the anterior abdominal wall, and the abscess was then drained by a separate incision without opening the peritoneum.

The second is that of a small boy, aged 2 years, sent in as a case of appendix abscess for immediate operation. When first seen no one could give the history of the case, but he had tenderness in the right iliac fossa with marked rigidity, and by gentle palpation a mass was found in the centre of the right iliac fossa. The child was feverish, temperature 101°F. and any attempt to move the right leg was resisted with loud cries. There were signs that the child had had an impetiginous eruption, but this was completely healed, and there were no enlarged or tender glands in the groin or anywhere else. The theatre was prepared, and the child made ready for operation. In this interval the child's father arrived and gave the following history. Eight days before the child developed fever, and a limp with the right leg, he was absolutely certain that the child had had no pain before the development of the fever. This history immediately suggested that the diagnosis was not appendix abscess but probably suppurating deep iliac glands. A grid-iron incision was made, and the appendix was found to be free and slightly inflamed externally, but the abscess was entirely retro-peritoneal.

Summary

1. The pathology of acute appendicitis suggests that a constant type of history could be elicited from all cases.

2. Clinical experience supports the deduction, and an indirect method of ascertaining the type of pain is described which enables an accurate history to be obtained even from the uneducated.

3. Physical signs can only confirm a diagnosis made on the history and give an indication of the position of the appendix.

4. The irrelevance of clinical laboratory methods is indicated.

5. Two cases are described which show the value of the method of elucidating the history.

Bibliography.—The description of acute obstructive appendicitis as given by Miles and Wilkie (1936) has now passed into most recent surgical textbooks. The physical signs are also to be found in the textbooks of Bailey (1940) and Cope (1940).

Busch and Spivack (1940) have discussed the pulse rate and other factors in assessing the severity of the process in acute appendicitis and its complications.

The obstructive basis of acute appendicitis has been described by Horsley *et al.* (1939), Bowers (1939), and especially Wangensteen (1939), in American literature, whilst Arnheim and Neuhof (1940) have dealt with the typical history in acute appendicitis and its relation to physical signs.

BIBLIOGRAPHY

ARNHEIM, E. E., and NEUHOF, H. (1940). *Surg. Gyn. Obstet.*, **70**, 42.

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A PLEA FOR REASONABLE ATAVISM IN THE TREATMENT OF FRACTURES

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IN no branch of our work is the active and optimistic co-operation of the patient more necessary than in bone and joint surgery. Before the advent of *x*-rays, the treatment of fractures was much simpler, the doctor 'set' the broken bone, nobody doubting his word that it was 'set', splints were applied, the doctor paid a daily visit, and the patient proceeded to get well. Nowadays, the patient sees his *x*-ray pictures—if he does not, he suspects a sinister reason for their concealment—and unless the fragments are in good position he retains the idea that because there is some displacement there must be some disability. By faith and use a good patient can largely overcome this, but unless his doctor possesses hypnotic as well as orthopædic powers there is always at the bottom of the patient's mind the idea that the result would have been better in more competent hands.

In the lower limbs, and particularly in and near joints, there is an undoubted relationship between the amount of displacement and the amount of disability, and any method which safely puts the fragments in good position is to be commended.

Under the influence and inspiration of Böhler, Watson-Jones and others, the routine treatment of fractures has in recent years completely changed, the 'closed' method being almost universal and the 'open' method rather despised. It is not, however, sufficiently realized that the magnificent results of these masters *cannot* be achieved without profound knowledge and experience, a first class team, nurses wise in orthopædics, constant attention, proper apparatus, good plaster-of-Paris, and, last but not least, adequate *x*-ray apparatus, including a good portable set.

How many of these basic necessities are to be found in an ordinary civil or military hospital? Not more than one or two, so that instead of

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BAILEY, H. (1940) .. *Demonstrations of Physical Signs in Clinical Surgery.* Williams and Wilkins Co., Baltimore.
BOWERS, W. F. (1939). *Arch. Surg.*, **39**, 362.
BUSCH, I., and SPIVACK, A. H. (1940). *Surg. Gyn. and Obstet.*, **70**, 241.
COPE, Z. (1940) .. *The Early Diagnosis of the Acute Abdomen.* Oxford University Press, London.
HORSLEY, J. S., HORSLEY, J. S., and HORSLEY, G. W. (1939). *J. Amer. Med. Assoc.*, **113**, 1288.
MILES, A., and WILKIE, D. P. D. (1936). *Operative Surgery.* Oxford University Press, London.
WANGENSTEEN, O. H. (1939). *Proc. Inst. Med. Chicago*, **12**, 266.
Idem (1939). *Journal-Lancet*, **59**, 491.

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getting results like those shown in Böhler's and Watson-Jones's books the general surgeon often has to content himself—but not his patients—with a much lower standard.

What is the remedy ? The ideal would be to segregate all difficult fractures in special hospitals with special staffs, who would remain there and not be moved to another place as soon as they had become proficient. As this ideal is obviously unattainable during our lifetime I advise the general surgeon to reconsider plates, screws, grafts and wires, on the strict understanding that these should be used only when the resources at his command do not permit him to put *and maintain* the fragments of a broken bone in good position.

The sort of case that comes to one's mind is the following : ten years ago, when I was civil surgeon, Quetta, I saw a young man with a severe but simple Dupuytren's fracture of the ankle. Manipulate it how we would under the screen, we could not get the lower fragment of fibula into position. I therefore put a small plate on the fracture and screwed the lower end of the fibula to the tibia. Six months later, being president of the local football league, I was presenting a cup to the winning team, in which, to my surprise, I recognized my patient as a prominent player.

Another case, which suggests that sepsis is not always the disaster it seems : some months ago I had to break down and plate a very malunited fracture of the tibia; conditions were not ideal and I had not anticipated plating, but had to do it as it was the only way of keeping the fragments in position. The case went septic and the wound had to be freely opened after ten days. After a feverish month, I removed the plate and put the leg in plaster. The fragments remained in good position, the wound healed, and the patient is now walking about with a much better leg than he had before the operation. In the above case it was not possible to carry out the correct technique, which should be both aseptic and antiseptic.

By 'aseptic', in addition to what is usually understood, I mean—(*a*) careful preparation of the skin : the skin is well washed with 40 per cent 'Dettol' on two successive days, the wet shaved skin being covered with a sterile towel; the operation is done on the third day, on the morning of which the skin is painted with tincture of iodine, 1/1,000 flavine or violet-green in spirit, this being repeated on the table; (*b*) the surgeon and his assistants must be certain that there are no holes in their gloves and that the latter are properly sterilized; as wet sterilization is messy, and gloves in India do not survive the drastic dry sterilization they can endure in England or America, they should be autoclaved for only ten minutes at ten pounds pressure, and painted with iodine or flavine in spirit after they have been put on; (*c*) 'no touch' technique, nothing that goes into the wound should be

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EXAMINATION OF CHOLERA VOMIT

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WE have found in the literature no record of the isolation of *Vibrio cholerœ* from the vomitus of cholera cases. Vibrios can be isolated from a single sample of the vomit in 50 per cent of cases in our experience. A higher percentage of isolation is probable if more than one sample can be examined. Thus a laboratory diagnosis of cholera can sometimes be made by bacteriological examination of the vomitus.

Isolation of vibrios.—Sterilized glass pots covered with Petri dishes were kept ready by the bedside of patients, and as soon as the patients vomited, the vomitus was collected directly into the pots and about 2 c.cm. of each sample was at once put into peptone water (pH 9.0). Direct plating was done on bile-salt

(*Continued from previous column*)

touched even with the gloved hand and the plates and screws should be taken straight out of the sterilizer.

By 'antiseptic technique', I mean the use of 'M.&B. 760' ('thiazamide') powder. The screw holes should be powdered, and two or three times during the operation, essentially just before sewing up, the whole wound should be powdered to its depths with this drug. For five days after the operation thiazamide should be given by the mouth in adequate doses; if it is unobtainable, M.&B. 693 or ordinary sulphanilamide may be used as a powder during the operation and afterwards by the mouth.

Screws and plates should if possible be of vitallium, which is completely inert and harmless to bone. If these cannot be obtained, the old-fashioned Lane's plates and screws give just as good results now as they did in their hey-dey thirty years ago, but it is better to remove them after the fracture has firmly united. A plated bone must, of course, be put up in plaster and guarded against lateral stresses and strains just like an unplated bone, otherwise there will be deformity or non-union.

Particularly at the present time, when shortage of doctors and staff renders impossible the employment of a team up to Böhler or Watson-Jones standards, I recommend general surgeons to look once again with favour on open operation for cases which cannot otherwise be kept in really good position, and if they observe the principles outlined above I think that they and their patients will have some pleasant surprises.

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agar in the laboratory about two hours later. Sometimes to induce vomiting, sterile distilled water was given to drink.

Cholera cases	Vomits showing vibrios		Percentage
52	26		50
	Agglutinable vibrios ..	11	
	NAG vibrios ..	5	
	Lost before typing ..	10	
	Positive on direct plating only	13	
	Peptone water enrichment only	3	
	Positive by both methods	10	

The above table shows that direct plating gave a higher percentage of positive results. This is probably due to the fact that coliform organisms present in the vomit cannot overgrow the vibrios when the vomit is plated direct on bile-salt agar. In some samples, vibrios were isolated in pure culture on direct plating. By the direct plating method, no vibrios were found in 3 samples in which isolation was successful by the enrichment method. On the other hand, direct plating gave positive result in 13 samples in which the enrichment method failed. Thus it appears advisable to use both the methods for isolation of vibrios from vomitus.

Reaction of vomits :—

pH of vomits	Number of cases	Number of samples positive for vibrios
2.4 to 4.9	12	0
5.0 to 5.9	7	4
6.0 to 6.9	19	10
7.0 to 8.4	14	12
TOTAL	52	26

The commonest pH was from 6.0 to 7.5. Isolation becomes common at a pH above 6.0 and is highest above 7.0. Vibrios being highly sensitive to acids, none were found at a pH below 5.0. Gastric contents were acid in 38 samples out of 52.

Sodium chloride content.—The amount of sodium chloride present in the vomitus varied from 66 to 821 mg. per 100 c.cm. and bore no relation to the hydrogen-ion concentration of the vomits. For example, at pH 6.0, the amount of sodium chloride varied between 122 and 293 mg. per 100 c.cm. It was 122 mg. in one patient who had no water to drink before the vomit was collected, 283 mg. in another similar patient, and 293 in a third patient who drank a little tap water before collection of his vomit.

Types of vibrios isolated.—Only one type of vibrio was isolated from one and the same vomit, Inaba sub-type from 3, Ogawa sub-type from 8 and non-agglutinating (NAG) type from 5 vomits.

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PROTEOLYTIC SYSTEM IN NORMAL AND VARIOUS PATHOLOGICAL CONDITIONS

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and
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IT is generally recognized that certain pathological conditions influence metabolic processes. Intensive changes in nitrogen metabolism are associated with a large variety of diseases, such as febrile stages of acute infectious diseases, severe diabetes, nephritis and other diseases of the kidney, toxæmias of pregnancy, kala-azar, cancer, etc. It seemed probable that such changes in nitrogen metabolism would be reflected in some way in the proteolytic system of blood. Becher (1933) has suggested that the increased nitrogen metabolism often observed in renal insufficiency may be brought about in part by the retention of proteolytic ferments. Increases in katabolism of body protein are reported to occur when nitrogen retention is the

(*Continued from previous column*)

Ten strains were lost before typing. As a rule, vibrios from vomits were serologically identical with those isolated from stools of the same case. It is interesting to note that a few cases showed the presence of only NAG vibrios in the vomitus whereas Ogawa sub-types were present in the stools of those cases. It is proposed to study further the correlation between the vibrios in vomits and stools. It is also interesting to note that in five cases agglutinating vibrios were isolated from the vomitus but isolation from the stools collected on the same day was not successful. Thus it appears that an examination of the vomitus will serve as an additional valuable method for bacteriological diagnosis of cholera.

Summary

1. Cholera can be diagnosed bacteriologically by examination of a single vomit on direct plating as well as by plating after primary enrichment in alkaline (pH 9.0) peptone-water in about 50 per cent of cases.

2. As a rule, vibrios isolated from vomits and stools of the same patient are serologically identical but discrepancies have been met with.

3. The pH of the vomit varies between 2.4 and 8.4, but it is usually above 6. No vibrios are isolated from vomits with a pH less than 5. The higher the pH, the more commonly are vibrios isolated.

4. The amount of sodium chloride in the vomitus varies widely from 66 to 821 mg. per 100 c.cm. and bears no relation to the hydrogen-ion concentration of the vomitus.

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result of extra-renal causes, *e.g.*, extreme dehydration (MacKay and MacKay, 1924). Tumour and embryonic growths are characterized by rapid cell division which involve, among other things, an intensive protein metabolism for building up the protein constituents of the cell. Weil and Russell (1938) have shown that during tumour growth or pregnancy in rats, the plasma proteinase activity drops considerably. When the tumour is removed by operation or after termination of pregnancy, the proteinase activity returns to the normal level.

The study of the proteolytic system in blood in its relation to various pathological and clinical conditions has not received the attention it deserves. Abderhalden (1937) and Hedin (1919) have demonstrated the presence of a proteinase in serum, active near neutrality. Schmitz (1937) and Iyengar and Scott (1940) have clearly shown that the proteinase circulating in blood is of a tryptic nature. Cooke (1932) has reported that blood protease is increased in chronic myeloid leukæmia. Loeper *et al.* (1932) have conducted experiments which indicate that the decrease in serum albumin during renal impermeability, whether due to nephritis or to ligation of the renal pedicle, is partly due to retention of proteolytic enzymes in blood. Vercellana (1935) has reported that trypsin is practically absent in blood from six cases of carcinoma. Ferranti and Slavich (1937) have found a high protease content in diabetes. However, there is no record of a systematic study of the plasma trypsin, both free and combined, in a number of pathological conditions commonly met with in hospital practice. This study was taken up to ascertain whether altered protein in the body as a whole brings about any changes in the enzymic content of blood.

EXPERIMENTAL

I. *Materials and methods*

(*a*) Determination of free plasma trypsin activity :—Two c.cm. of citrated plasma are precipitated with 8 c.cm. acetone and centrifuged. The precipitate is washed with acetone and allowed to dry for a few minutes. The whole precipitate is then mixed with 10 c.cm. of phosphate buffer of pH 8.4 in a glass mortar to get a uniform suspension. Three c.cm. of this suspension are taken in a test-tube and 3 c.cm. of 10 per cent trichloracetic acid are added to it. The contents are well shaken and filtered. The nitrogen content of 3 c.cm. filtrate is estimated by the micro-kjeldahl method. A few drops of toluene are added to the remainder of the suspension which is incubated at 37°C. for 48 hours. At the end of this period, 3 c.cm. of this suspension are mixed with 3 c.cm. of 10 per cent trichloracetic acid, filtered, and the nitrogen in 3 c.cm. of the filtrate is estimated. The increase in non-protein-nitrogen (NPN) is taken as a measure of tryptic activity of plasma. The tryptic activity is finally calculated for 100 c.cm. of plasma in terms of the increase in NPN.

(*b*) Determination of total plasma trypsin (both free and combined):—Two c.cm. of citrated plasma are precipitated with 20 c.cm. of 2.5 per cent trichloracetic acid and centrifuged. The precipitate is once washed with 2.5 per cent trichloracetic acid and then twice with acetone. The final precipitate is treated in the same manner as above and the increase in NPN determined. By treatment of plasma first with trichloracetic acid, the trypsin-inhibitor compound is dissociated into its components. The inhibitor being a low molecular weight polypeptide is not precipitated by trichloracetic acid, whereas both the original free trypsin and the newly liberated trypsin being associated with plasma proteins are precipitated. This precipitate, after being washed with acetone, will be free from trichloracetic acid and the total tryptic activity of the protein precipitate is indicated by increase in NPN after auto-digestion in the suitable phosphate buffer for 48 hours.

(*c*) The amount of trypsin inhibitor present in plasma was determined by the difference between the free tryptic activity and the total (free and combined) tryptic activity of plasma.

II. *Results*

The results of the determination of free and total plasma trypsin content in a number of normal cases and in various pathological conditions such as cancer, diabetes, kala-azar, filaria, nephritis, acute infectious diseases, anæmia, thrombocytopoenic purpura, etc., are given in the following table :—

TABLE

Pathological conditions	Serial numbers	Free plasma trypsin content	Total plasma trypsin content	Difference
		expressed as increase in NPN for 100 c.cm. plasma		
Normal ..	1	15.4	75.2	59.8
	2	18.8	84.6	65.8
	3	24.6	78.1	53.5
	4	16.2	75.2	59.0
	5	32.8	69.4	36.6
	6	18.4	74.6	56.2
	7	28.9	82.1	53.2
	8	41.4	84.5	43.1
Cancer of—				
Stomach ..	1	2.1	8.9	..
" ..	2	4.6	12.2	..
Penis ..	3	3.8	9.8	..
Colon and rectum	4	6.2	12.4	..
Bladder ..	5	4.6	10.8	..

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TABLE—*concld.*

Pathological conditions	Serial numbers	Free plasma trypsin content	Total plasma trypsin content
		expressed as increase in NPN for 100 c.cm. plasma	
Diabetes	1	35.0	68.4
	2	46.6	76.8
	3	55.2	81.4
	4	38.6	72.8
	5	41.4	64.8
	6	32.4	66.9
Kala-azar	1	18.5	65.8
	2	22.6	72.7
	3	16.8	75.2
	4	28.9	68.4
	5	19.9	72.6
Filariasis	1	17.4	74.8
	2	18.9	72.5
	3	22.4	69.4
	4	32.8	68.8
	5	19.4	74.2
	6	25.6	69.9
Nephritis	1	48.6	79.8
	2	56.8	68.6
	3	39.4	74.6
	4	46.8	68.9
Acute infectious diseases—			
Typhoid	1	24.6	69.7
„	2	32.8	58.8
„	3	31.4	64.6
Smallpox	4	18.4	59.8
„	5	26.2	71.6
Anæmia	1	8.1	18.9
	2	2.4	17.6
	3	*nil*	14.2
	4	3.2	18.5
Thrombocytopoenic purpura	1	*nil*	12.4
	2	2.1	16.8
Miscellaneous—			
Obstructive jaundice ..	1	32.8	84.5
„ „ ..	2	41.6	78.6
Biliary fistula	1	39.4	79.8
„ „	2	42.8	82.9
Cirrhosis of liver ..	1	38.2	79.7
Hæmophilia	1	1.8	..

Comment and discussion

The free trypsin content of normal plasma is found to vary within fairly wide limits, whereas the total tryptic activity appears to be constant within reasonable limits considering the fact that we are dealing with a biological entity which is bound to vary from individual to individual. It should therefore be concluded that the inhibitor is present in varying quantities. The blocking of trypsin depends upon the amount of the inhibitor present. This variation in the quantity of the inhibitor is reflected in the last column of the table wherein is expressed the difference between free trypsin and total trypsin in each subject. The average value (free trypsin content) for the increase in NPN for 100 c.cm. plasma as a result of auto-tryptic activity can reasonably be taken as 24 mg. as most of the values are round about this figure for normal cases.

If this average value is taken as the basis for comparison, a significant fall in the free tryptic activity of plasma is noticed in cancer patients. This reduction in tryptic activity of plasma cannot be due to any increase in the amount of trypsin inhibitor circulating in the blood, since the total (free and combined) tryptic activity has also undergone a radical fall from a normal average value of 77.9 mg. to 10.9 mg. At the present state of our knowledge of cancer, it is impossible to speculate on the cause of this reduction. If, as is generally recognized, the origin of plasma trypsin is from the formed elements in blood, it must be assumed that the formed elements have somehow lost the capacity of synthesizing this enzyme. Weil and Russell (*loc. cit.*) have found that the proteinase activity is restored to normal after the removal of tumour in rats by operation. It is likely therefore that the reduction in the trypsin content of plasma is more a manifestation of the disease rather than a causal factor. The malignant growth can only be digested by the proteolytic enzyme of the blood circulating through the tumour tissues. When the trypsin is practically absent the chances of the removal of the growth by enzymic digestion are very much reduced. This is probably the reason why the auto-regression of the tumour is rarely observed in clinical practice.

In diabetes, there appears to be a tendency for the free trypsin in plasma to rise. The average value is 41 as compared to the average normal value of 24. Though this cannot be regarded as very significant, it definitely points to an increase in trypsin content of plasma. The total trypsin content does not undergo any appreciable change. It is probable therefore that the observed rise in the free trypsin content is due to a lowered amount of inhibitor present in blood in diabetes. It is possible that the deranged carbohydrate metabolism in diabetes may be responsible for the deficiency in the formation of inhibitor in the blood.

No significant change either in free or combined plasma trypsin in kala-azar, filaria or acute infectious diseases, *e.g.*, typhoid and smallpox, is observed. Although a rise in free plasma trypsin content is noticed in obstructive jaundice, biliary fistula and cirrhosis of liver, the number of cases experimented upon is too meagre to warrant any definite statement.

A significant increase in free trypsin content of plasma is observed in nephritis. The average value is 47.7 as compared with the normal of 24. In nephritis the degree of nitrogen accumulation in blood depends not only on the functional

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efficiency of the kidney, but also on the rate of protein katabolism. The increased trypsin content is probably an index of enhanced protein katabolism.

In anæmia and thrombocytopoenic purpura, the free trypsin is almost negligible. The total trypsin (free and combined) is also considerably reduced. These results lend very interesting experimental evidence to the popularly accepted belief that the trypsin in plasma is derived from the break-down of formed elements in blood during circulation. As the red blood corpuscles and the platelets are very much reduced in anæmia and thrombocytopoenic purpura, respectively, the two important sources of trypsin supply to blood are not available and this is probably reflected in the very low free and total trypsin content of plasma.

Ferguson (1939) has explained the delay in the coagulation of hæmophilic plasma as due to a deficiency in the amount of thromboplastic enzyme. This enzyme is reported by the same author to be very much similar to trypsin. Iyengar (1942) has adduced experimental evidence in favour of the hypothesis that the physiological thromboplastic substance circulating in blood may be trypsin itself. It was therefore considered of great interest to study the trypsin content of hæmophilic plasma. It is very difficult to get a genuine case of hæmophilia. Advantage was taken of a bleeding case admitted to the Carmichael Hospital for Tropical Diseases, which was suspected to be hæmophilia with a very prolonged clotting time. The free plasma trypsin was found to be almost negligible.

Summary

1. In view of the generally recognized rôle of trypsin in various physiological processes, *e.g.*, nitrogen metabolism, blood coagulation, destruction of hormones in the circulating blood, etc., a systematic study of the plasma trypsin contents in normal and various pathological conditions was undertaken.

2. The free trypsin content of the plasma in normal individuals was found to vary from 15 mg. to 41 mg. per 100 c.cm. of blood with an average reading in majority of cases of 24 mg. The total trypsin content was found to maintain a constant level in all the cases studied.

3. In cancer, the free trypsin content of the plasma showed a definite diminution whereas in diabetes and nephritis, there is either a tendency to increase or a marked increase in the content of free trypsin. In anæmia and thrombocytopoenic purpura, both the free and total trypsin are practically absent. In filarial conditions, kala-azar and acute infectious diseases, such as enteric, variola, etc., no significant change in the trypsin contents was observed.

4. The possible explanation of such differential changes in normal and in the pathological conditions studied has been attempted.

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DETERMINATION OF THE AGE IN BENGALI GIRLS IN MEDICO-LEGAL CASES—SOME PRACTICAL DIFFICULTIES. THE ROLE OF *X*-RAY EXAMINATIONS OF BONES *

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MAJOR, A.I.R.O.

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DURING my tenure of office, for nearly 10 years, as police surgeon of Calcutta and professor of medical jurisprudence of both the medical colleges in Calcutta, no other subject presented so many difficulties and peculiarities as the determination of age in girls in medico-legal cases. So I thought that I would get some of my difficulties solved by bringing in this subject before you and starting a discussion.

I will put the subject before you in a simple way especially in connection with the cutting and growth of the teeth, and the union of the ends of the long bones to the shafts and the age at which this happens in our girls. Incidentally, examination of the teeth and the examination of the bones by *x*-rays are the two most important items in this connection.

Lately, I have noticed that there is a great tendency amongst lawyers to pin their faith on

* A résumé of a paper read at the Campbell Medical College Reunion.

(*Continued from previous column*)

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REFERENCES

ABDERHALDEN, E. (1937). *Scientia*, **61**, 217.
BECHER, E. (1933) .. *Ergebn. ges. Med.*, **18**, 51.
COOKE, J. V. (1932) .. *Arch. Intern. Med.*, **49**, 836.
FERGUSON, J. H. (1939). *Amer. J. Physiol.*, **126**, 669.
FERRANTI, F., and SLAVICH, E. (1937). *Arch. Sci. Med.*, **64**, 297.
HEDIN, S. G. (1919) .. *Zeitschr. Physiol. Chem.*, **104**, 11.
IYENGAR, N. K. (1942). *Proc. Indian Academy Sci. Sec. B.*, **15**, 123.
IYENGAR, N. K., and SCOTT, D. (1940). *Trans. Roy. Soc. Canada, Sec. V.*, **34**, 45.
LOEPER, M., SOULIE, P., and LESURE, A. (1932). *Compt. Rend. Soc. Biol.*, **110**, 513.
MACKAY, L. L., and MACKAY, E. M. (1924). *Amer. J. Physiol.*, **70**, 394.
SCHMITZ, A. (1937) .. *Zeitschr. Physiol. Chem.*, **250**, 37.
VERCELLANA, G. (1935). *Zeitschr. Krebsforsch.*, **43**, 163.
WEIL, L., and RUSSELL, M. A. (1938). *J. Biol. Chem.*, **126**, 245.

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x-ray findings of bones. The question invariably asked was 'Doctor, is not *x*-ray the surest way of finding the real age of a girl ?'. I may tell you at once, it is not. It has not improved matters very much. They want to know, for instance, whether a girl on the day the offence is committed was 14 years, or over or under. There is nothing by which you can say whether the girl is exactly 14 years or one day older or one day younger. Section 372 I. P. C. says—

'Whoever sells, lets to hire, or otherwise disposes of any person *under the age of* 18 *years* with intent that such person shall at any age be employed or used for the purpose of prostitution or illicit intercourse with any person or for any unlawful and immoral purpose, or knowing it to be likely that such person will at any age be employed or used for any such purpose, shall be punished with imprisonment of either description for a term which may extend to 10 years, and shall also be liable to fine.'

Section 375 I. P. C. says :—

'A man is said to commit "rape" who, except in the case hereinafter excepted, has sexual intercourse with a woman under circumstances falling under any of the five following descriptions—1, 2, 3, 4, and 5 with or without her consent, *when she is under* 14 *years of age*.'

'Whoever commits rape shall be punished with transportation for life, or with imprisonment of either description for a term which may extend to 10 years and shall also be liable to fine, etc., etc.'

With our present-day knowledge we may make a mistake of 1 to 3 years. Even with my long experience I may make a mistake of 6 months this side or the other side of the real age of the girl. I can never give the correct age. I always say, for instance, that a girl is about 15 years of age, that is to say, she may be 14 years 6 months to 15 years 6 months.

I may here give an instance of two sisters I had examined in connection with the Immoral Traffic Act in Calcutta. I examined a girl named Binapani brought to me by the police after they had rescued her from a brothel in the northern part of the city. After carefully examining her, I gave my opinion that she was about 16 years of age on the date of examination. A few days later, another girl named Saraswaty was rescued from a neighbouring brothel in the same locality and sent up to me for examination. In this case also I gave my opinion that the girl was about 16 years of age. Whilst deposing in court I found that the two girls were sisters. Binapani was 16 years and 5 months old and Saraswaty was 15 years and 6 months old, these two sisters having been born within one year of each other.

Now a healthy child when born is a perfect human being for all practical purposes. Of course, during the first 10 days or so, it is adjusting itself to its new surroundings. As is well known to you that before its birth the fœtus floats in a bag of fluid almost like water and so its respiratory apparatus does not work, it gets all its nourishment and water from the mother through the placenta and the umbilical cord and it purifies its blood through the mother's blood and so on. Immediately after birth, it has to breathe and purify its own blood through its own lungs, its circulatory system has to adapt itself to its new way of living, it has to imbibe its own nourishment and excrete its own waste products through its own systems concerned. After this initial period it continues to grow. Now what do we mean by the word 'grow'. Broadly speaking, mother nature does three things. Firstly, the mind of the baby begins to form and gradually goes on developing. Secondly, she makes the baby fit so that it will survive the struggle for existence and continue to live. Thirdly, she makes the baby fit gradually to be able to reproduce its own kind. All these in the case of human being takes about 16 to 18 years, and, after the end of this period, it is a complete natural being, able to think and act for himself, get its own food and is able to mate and reproduce its own kind. For our purpose its growth has ceased. Now all these facts connected with the growth of the being are taken advantage of by medical men for the determination of its age, say up to the 18th year of its life. That is to say, we can very approximately form an idea of its age after examining the various parts of its body including the growth and completion of the formation of the bones by *x*-ray examination. After this age there is nothing which is of slightest use to us in determining its age. For instance, a person may look to be 25, but may be 30 or 35.

Now let us see what facts or factors we consider while trying to determine the age of a girl. First, general appearance and development; second, the height; third, the weight; fourth, the cutting and growth of the teeth; fifth, signs of approaching puberty, namely, (*i*) the development of the breast, (*ii*) growth of hair in the arm-pits and over the pubic region, (*iii*) establishment of menstruation, (*iv*) general enlargement of the external genitals, (*v*) alteration of the disposition of the girl, and (*vi*) fuller contour of the body, namely, enlargement of the hips, general gracefulness, etc.; sixth, the *x*-ray examination of the bones to see how far their growth has taken place, and lastly seventh, the degenerative changes. As you know, most of these except the teeth and the bones do not help us very much. As a matter of fact these taken individually are of little use to us, but all of them considered together, an experienced doctor can give a fairly approximate idea of the age and his mistake may be within a year of the real age, *i.e.*, 6 months more or 6 months less than her exact age. However I will take these up one by one and see how far we can rely on them.

I. *General appearance and development.*—This as you know is very unreliable. I will tell you how in an unguarded moment I let myself down once. I was asked by a friend of mine to go and examine his sister who was not well. She was a girl from western India. She was seated

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on a bed when I saw her and she appeared to me at first sight to be about 17. I examined her and before writing the prescription I asked her mother about her age. She told me that her daughter was about 26 years of age. I was taken by surprise and I asked her if she was sure because to me the girl looked like 17. In spite of this, by experience gained after examining a large number of girls, we can have a rough idea of the age from the general appearance and development of the girl. The important thing is to look carefully at her face before forming the idea.

II. *Height.*—As you know there is no standard of height of our girls worked out which is of any use to us. The girl goes on growing taller and taller, so long the long bones are not completely ossified. As soon as the bones are completely ossified her growth in length ceases and she remains more or less constant. A girl generally shoots up about the age of 11 or 12, and may cease to grow after 14. Some of them may go on till 16 or 17. I shall tell you later how this growth takes place in connection with the bones. A healthy Bengali girl should be about 5 feet and $1\frac{3}{4}$ inches tall at 16 and should weigh about 8 stone and 1 pound.

III. *Weight.*—This also varies very much and there is no standard on which we can depend for our guidance.

IV. *The teeth.*—As is well known, we have two sets of teeth, namely, the milk or temporary teeth and the permanent teeth. The milk teeth are 20 in number and are small, delicate, not meant for crushing or chewing hard substances. They begin to cut when the baby is about 6 months old and they all finish cutting about the age of 24 months. After this, up to the age of 6 years, they continue to grow in size, become bigger and rise higher and higher on the jaws till the whole crown (that is, the visible part of the teeth above the gum) is well up. There are two incisors, one canine and two molars or grinders in each half of each jaw. In the beginning they completely fill up all the available space in the alveoli of the jaws, but as the child grows older its jaw grows bigger and space becomes available for the cutting of the first permanent teeth behind them.

The permanent teeth begin to cut about the age of 6 years and it is the first molar which is first to cut, usually before any of the milk teeth are shed. The jaws become bigger and bigger and space becomes available behind for the cutting of the second and the third permanent molars. If, for defective growth or any other reason, space is not available we get lots of trouble with the cutting of the third molar which is also called the wisdom tooth or *akkal danth*. All the other permanent teeth appear in the space in front of the first molar, which is occupied by the milk teeth and which are gradually replaced by them. There are two incisors, one canine, two bicuspids or premolars, and three molars or grinders of the permanent set in each half of each jaw. I have examined the cutting and growth of the teeth in a fair number of children of known ages and to my mind the following table gives an approximate idea of the age of their cutting. These are entirely approximate. There may be difference of 1 or 2 months in each case. For all practical purposes the figures are useful.

Milk teeth

Order of cutting	Name of tooth	Age
1	Lower central incisor ..	6–8 months
2	Upper central incisor ..	9 „
3	Upper lateral incisor ..	10 „
4	Lower lateral incisor ..	10 „
5	First temporary molar ..	12 „
6	Canine	18 „
7	Second temporary molar	24 „
	Permanent set	
1	First molar ..	6 years
2	Central incisors ..	7 „
3	Lateral incisors ..	8 „
4	Anterior bicuspid ..	9 (9–10)
5	Posterior bicuspid ..	10 (10–12)
6	Canine	11 (11–12, rarely 13).
7	Second molar ..	12 (12–13)
8	Third molar ..	17–25 (generally about 18).

In these also the ages are approximate, the ages of their cutting may vary by 1 or 2 years, especially in the case of bicuspids and canines. Now it is apparent that a girl aged 12 or little over should have cut all her teeth, except the third molars. After the cutting of the second molar, a space is becoming available for the cutting of the third, they are gradually coming up, pushing up the muco-periosteum above them and about the 18th year the crowns of these teeth cut through the muco-periosteum and become visible. In my experience I have found that the third molars cut in a very large majority of girls about the age of 18. Of course, there are some variations, but these are almost always on the side of precocity, rarely on the other. This is a very important point to note. You will remember that the second molars, that is to say, the immediate predecessors of the third molars, are generally cut about the age of 12 or a little later. The jaw is getting bigger and a space is becoming available for the coming of the third molar. This begins to come up at the age of 16, pushes up the muco-periosteum and can now be seen or felt behind the second molar. Before actually cutting, it rises higher and about the age of 18 it comes through and is visible. Therefore when examining the teeth of girls who look 16, or about 16, we must carefully note the condition of the coming of the third molar. There is another very important point about this. The third

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molars, especially the upper ones, are sometimes deflected so that they are not visible or felt just behind the second, but are on the lateral aspect of the gum. So we are likely to miss this tooth, if we are not careful, more especially if we remember that the third upper molars are comparatively smaller than their brothers.

V. *Signs of approaching puberty.*—Nature begins to prepare the girl for mating and conceiving. She is made attractive and her organs of reproduction both external and internal get mature and become fit for reproducing her kind. These begin about the age of 12 in healthy girls, and by about the 14th year she is generally sexually mature.

(*i*) *The breast.*—These two modified sweat glands are accessory glands of the generative system. They are present in males as well as in females, but in the former they remain mostly in the rudimentary state. In the female, they are two large hemi-spherical eminences lying within the superficial fascia on the front and sides of the chest. Each extends vertically from the second to the sixth rib and transversely at the lavel of the fourth costal cartilage from the sides of the sternum to near the mid-axillary line.

In weight and size they differ at different periods and in different individuals. Before puberty, they are small but they enlarge as the generative organs become more completely developed. On the superficial surface of the breast is a conical prominence called the nipple or papilla situated about the level of the fourth intercostal space. The breast begins to enlarge about the age of 12 and by about 14 years they are generally fully formed. I have seen fully formed breast in girls aged about 11; on the other hand I have seen girls of 15 who had small breasts.

(*ii*) *Growth of hair* (in the arm-pits and over the pubic region).—Over these places the hair begins to grow about the age of 11. At first, it is very thin downy soft and pale coloured. It gradually becomes thicker, coarser, and black, and by about the 14 or 15th year, it is fully developed and may be one or two inches long. But I have seen fairly formed hair in girls aged about 10, especially among the Jews. On the other hand, I have seen women of 17 or 18 with practically no hair in the arm-pits and very scanty hair over the pubic region.

(*iii*) *Establishment of menstruation.*—The period at which this takes place varies very much amongst our girls and for our purpose it is equally useless. A daughter of a friend of mine menstruated at the age of about 11 and became a mother at the age of about 12.

Regarding other items under this heading all are equally unreliable and are of very little use to us.

VI. *The x-ray examination of the bones.*—I will tell you what exactly happens in the bones which we *x*-ray and utilize for forming an idea of the age of a girl. All workers on the subject agree that the completion of the growth of the bones in this country takes place much earlier than in Europe and America. It may be anything up to 1 to 3 years. Again, we have found that the same bone which has united and completed its growth, say at 14, has not done so in another girl at 18. For instance, it was found that the upper end of the humerus had united at 14 in one girl, whereas in another girl (my own daughter) it had not united when she was 17 years and 8 months old.

I will tell you now in a very simple and unscientific language what actually happens and how bones are formed and how we take advantage of this. When the embryo is only about 2 or 3 weeks old and is only about 1/8th of an inch long, it is still a mass of cells variously differentiated. Before this period there are no limbs. A little later two limb-buds appear, one for the future upper extremity and the other for the lower. They are also masses of cells but have their own blood and nerve supply, etc. In the places in the limbs where the future bones are going to be, the cells become concentrated and converted into rods of hyaline cartilage. About the 8th week of its intra-uterine life, when the fœtus is about one inch long, due to the influence of some of the internal secretions (anterior pituitary and the thyroid glands), hyperæmia and increased blood supply takes place about the middle of the long bones and calcium salts are deposited. This is the appearance of the primary centre of ossification and the beginning of the formation of the bones. This grows on all sides more specially towards its ends and forms a cylindrical piece of bone at the expense of the cartilage. At the time of birth the limb has the shaft or middle portion made up of the bone and two ends which are still cartilages. After the birth of the child the ends receive their centres, called the secondary centres, and are transformed into bones, the period being different for the different bones. Therefore, during early years of life the so-called bone consists of the rod or shaft of bone in the middle formed from the primary centre, a piece of bone at each end formed from the secondary centre, and a piece of cartilage in between the two where the growth in length of the bone takes place. After a certain number of years this cartilage disappears having been replaced by bone, union having taken place between the two, thereby completing the growth of the bone. After all the long bones are united, growth in length of the person ceases. The object of *x*-ray is to see the condition of this cartilage, whether it is present, what is its thickness, whether it is wholly or partly replaced by bone, etc. I have told you before that this age of union of the different long bones varies very much between Indians, Europeans and Americans. Now I shall tell you of the practical difficulty that I used to find in my daily work in determining the ages of girls sent to me. Those who have

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worked on the bones for finding the ages of union have worked on girls of *known* ages and have given us the ages at which they found the bones have united. But what happens to us ? A girl of *unknown* age is sent to us. We thoroughly examine her and examine some of her long bones with *x*-rays, and note the stage of the ossification of the bones especially of the intervening cartilage. Now comes the question of interpretation. Let us take an example. Suppose we may find that the lower end of the radius is not yet united. We ask when is this going to be united ? It may be one to four years before it is united. There is no fixed standard. A girl may be one or two years younger or older than another girl whose bone presents the same *x*-ray appearance. It has been suggested that the conditions of endocrine balance created by a super-abundance of ultra-violet radiation and warmth tend to produce a condition whereby a greater proportion of the calcium intake is assimilated and made available for the formation of bone tissue. The same conditions of ultra-violet radiation and warmth of different quantity also affect the formation of bones. Also the normal endocrine balance, if upset by pathological states, can produce remarkable variation from the normal rate of formation and union of bony centres. Hence the age we give is only approximate and the mistake may be anything between one to three years if the opinion is based on the bones only.

I may mention here two cases in point. First, a man aged 32 had all the appearances, physical and radiological, of a boy 12 to 14 years of age. Second, a man aged 20 had the appearance and radiological characteristic of a boy of 12.

VII. *Degenerative changes.*—Namely, wrinkles, grey hair, arcus senilis, etc.. These, as you know, are useless for our purpose. I have seen comparatively young fellows with grey hair and wrinkles, and I know a man who is only about 38 and has got an arcus senilis.

Conclusion

I will sum up by saying that the various data we have are useless, *if taken individually*, but when considered together and backed by experience of the examiner we can give a fairly approximate idea of the age of the individual, the mistake being only about 6 months this or other side of the real age.

I give here some of the bones and the ages of their union. If only these are *x*-rayed and taken into consideration it ought to be enough for our purpose.

Name of bone	Part of bone	Fusion of the epiphyses		
		Earliest	Average	Latest
Humerus ..	Upper end	14	14–16	18
	Lower end	11	12–13	14
Radius ..	Upper end	12	14	15
	Lower end	12	16–17	18
Ulna ..	Upper end	12	15	16
	Lower end	14	16–17	18
Carpal bones	Capitate 6 months.			
	Hamate 8 to 14 months.			
	Triquetrum 2 to 3 years.			
	Lunate 5 years.			
	Multangular majus 5 to 6 years.			
	Scaphoid 6 years.			
	Pisiform 9 to 12 years.			
Metacarpals	1st	13	14–16	18
„	2nd to the 5th		14–15	

A Mirror of Hospital Practice

A CASE OF PULMONARY MYIASIS ?

By D. H. BHATT, M.B., B.S. (Bom.)
Assistant Surgeon, In-Charge Vadali Dispensary

ON 10th November, 1941, a man was brought to the dispensary for treatment. He complained of fever, difficulty in breathing and occasional bleeding from the nose of dark red blood, and stated that small blood clots had been coming out, on blowing the nose, for the last three days.

The skin over the nose and upper lip was inflamed and swollen, the lower eyelids were œdematous, teeth were dirty and carious, the nares were a little larger than normal, and breath was foul smelling. On further inquiry the patient stated that his mouth always remained a little open during sleep.

On closely looking into the nostrils white dots—the terminal ends of the larvæ embedded in the submucous tissue—were seen.

The features of the case were typical of nasal myiasis. The patient stated that a couple of 'worms' had dropped out of his nose in the last two days.

The treatment—instillation of turpentine—was resorted to, and tinctura ferri perchloridi was painted on the inflamed parts. A few larvæ about 1 cm. long and 2 mm. broad, resembling a screw were picked out every day. For three days the above treatment was continued without any relief to the patient and the infection extended to the frontal sinuses. This was apparent from the skin in that region becoming inflamed and swollen and the upper eyelids œdematous.

As this subject has never been satisfactorily dealt with in the literature, there being no definite line of treatment I decided to use a mixture of creosote, beech-wood oil and oil eucalyptus in equal parts instead of turpentine and I sprayed it in the nostrils with a De Vilbiss atomizer.

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This mixture was irritating to the larvæ which were wriggling after the spray and it was easy to dislodge and remove them. This new mixture also stimulated coughing and the patient coughed out a couple of larvæ coated in sputum which was blackish. This led me to spray again until the patient had another spasm of coughing and eventually two more larvæ came out covered in sputum. The same evening (the spray was used twice a day) the patient stated that he had had a very troublesome cough throughout the day and about fifty worms were expelled mixed with sputum, besides some escaping from the nose.

This encouraged me to continue this treatment with addition of tinctura iodi mitis 0.5 c.cm. intravenously and seven and a half grains of sulphanilamide (P. D. & Co.) *t.d.s.* The injection was repeated on the fourth day.

With this line of treatment about 60 to 80 larvæ a day were coughed up for three days. Then the number gradually dwindled with steady improvement in the patient's condition. By the end of the week he was completely free from the disease.

From the beginning of this illness the patient had used *neem*-vapour inhalations—*neem* bark and *neem* leaves boiled with water and the steam coming therefrom inhaled—which were continued throughout the course of treatment.

During convalescence cod-liver oil mixture was administered.

Comments

Passing remarks have been found in the textbooks on the destructive activities of this type of parasite on subcutaneous tissues and bones, and meningitis is mentioned as a possible complication.

Mention of intestinal myiasis as a separate entity is also found, but nowhere is pulmonary myiasis mentioned as a separate entity or as a complication of nasal myiasis.

The following possibilities are of interest:—

Can the above case be considered one of pulmonary myiasis? Is it a complication of nasal myiasis? But this is unlikely because the patient never experienced any sensation or discomfort which he should have had during the passage of the parasites from the nose down through the larynx and trachea to the lungs.

Did the infection start simultaneously in two regions because the eggs of the responsible flies laid in the nostrils were inhaled and carried to the lungs?

[*Note.*—This is a clear case of nasal myiasis probably caused by *Chrysomyia bezziana*. Though Patton has laid considerable stress on the destructive action of their larvæ on soft tissues and bones as well, Strickland and Roy have recently reported that even in cases of infestation by biontophagous larvæ, generally no particular symptom is produced. Although some protease is normally excreted by larvæ with their fæces, it is extremely doubtful if it is qualitatively and quantitatively strong enough to act on healthy tissues, whether soft or hard.

Regarding treatment, it may be stated that it is not easy to dislodge first- and second-stage larvæ from wounds but when they are mature, there is a natural tendency for them to leave the wound and drop on the ground for pupation. At this stage there is, generally speaking, a rapid response to local treatment whatever may be selected for this purpose.—EDITOR, *I. M. G.*]

TRANSPOSITION OF HEART AND VISCERA

By K. P. ABDUL KHADER, D.M.S.
S. I. Railway Hospital, Trichinopoly

A MAN aged 25 years.

Occupation: Fireman, Trichinopoly Junction.

Chief complaint: Vague pain in front of chest. He stated he has had similar pain on previous occasions.

Duration: Three to four days.

Present history: The onset was sudden. The patient noticed one morning some vague pain in front of his chest and it grew in intensity and hence he sought medical aid at the hospital.

Previous history: Nothing of interest.

General examination: A well-built man of about 25 years; not anæmic; no clubbing of fingers or toes; no stunted growth.

Systematic examination: Temperature normal. Pulse rate 75, regular, full and bounding.

Cardiac system—contour of chest normal.

(*a*) *Inspection:* Apex beat visible in the fifth right intercostal space ½ inch below and ¾ inch medial to the right nipple.

(*b*) *Palpation:* Apex beat in the right fifth intercostal space.

(*c*) *On percussion*, the borders of the heart were:—Right—1 inch lateral to right nipple line. Left—1½ inches medial to left nipple line.

(*d*) *Auscultation:* Heart beat, well audible in the fifth intercostal area on the right side, no murmur; both sounds audible, rate normal, no accentuation.

Blood pressure: 100/65 (sitting).

Respiratory system: Normal.

Digestive system: (*a*) *Inspection:* Abdomen normal, moves with respiration; no distension.

(*b*) *Palpation:* Liver and spleen not palpable.

(*c*) *Percussion:* Liver dullness elicited on the *left* side corresponds to that usually found on the right side in a normal individual.

Nervous system: Normal.

Diagnosis.—Clinically a case of dextro-cardia with complete transposition of all abdominal viscera.

The pain which the patient complained of was of muscular origin only with no relationship to his developmental condition. His pain disappeared after 2 to 3 days of routine treatment with soda salicylas mixture and he was discharged cured.

Skiagraphy.—The diagnosis was confirmed by *x*-ray picture of the heart, and the barium-meal fluoroscopy of the gastro-intestinal tract revealed complete transposition of the abdominal viscera with normal motility and otherwise normal function.

Discussion.—In this case, the patient was leading an active and normal life without any outward symptoms; the case being found out during the routine examination.

Apart from the anatomical curiosity, the rarity of such cases is considered to justify its publication as it is the only case of dextro-cardia we have seen in the course of handling a large labour force.

Acknowledgment

My thanks are due to Dr. Jas. K. Manson, Chief Medical Officer, South Indian Railway, Trichinopoly.

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for his assistance which enabled me to come to a conclusive diagnosis and for his permission to report this case.

PROLAPSE OF RECTUM CAUSED BY VESICAL CALCULUS

By G. C. PATTANAYAK, M.B., B.S., D.T.M.

Orissa Medical Service, Kendrapara

A MIDDLE AGED labourer was admitted into hospital for prolapse of the rectum about 4 inches in length, with discharge of mucus, tenesmus and incontinence of urine for the past 1½ years. His main complaint was the continuous dribbling of urine. A tentative diagnosis of chronic bacillary dysentery, which had caused the rectal prolapse, and a reflex irritation of the bladder causing incontinence was made. Prolapse was easily reduced and rectal lavage with warm saline was given. The prolapse recurred as easily as it was reduced. Rectal lavage and rest having produced no effect, the bladder was examined with metal sounds and a fairly large vesical calculus was sounded. A rubber catheter could not be introduced for bladder washing. Any attempt at introducing irrigating fluid into the bladder immediately produced an involuntary straining and rectal prolapse. Rectal examination was very difficult, due to reflex straining.

Suprapubic cystotomy was performed and a large stone was taken out with difficulty. No cystitis being found, the wounds in the bladder wall and the parieties were sutured, with a small drainage tube under the skin. The patient made an uneventful recovery. There was no further recurrence of rectal prolapse.

The calculus.—The stone was phosphatic in nature and oval in shape. It measured 2 inches from tip to tip; 4 inches in circumference in the middle, and 5 inches in the tip to tip circumference. It weighed 105.5 drachms.

Discussion.—The calculus being large, it probably occupied almost the whole of the bladder cavity and no urine could be retained, causing the continuous dribble of urine. It also pressed upon the rectum. The straining for urination caused rectal straining for a long period. Continued straining for urination and the reflex straining of the rectum at the same time favoured the prolapse. When the original cause, namely, the stone was removed, the rectal prolapse was cured.

A CASE OF MENSTRUATION THROUGH THE UMBILICUS AS WELL AS PER VAGINAM

By SRI. A. G. PEREIRA, L.M.&S.

District Medical Officer, Coimbatore

A FEMALE Hindu, aged 28 years, was admitted into the Government Headquarters Hospital, Coimbatore, on 8th January, 1942, with the following complaints :—

For the last one year she was having pain in the lower part of the abdomen, and during the menstrual period the pain increased and she was passing blood through the umbilicus as well as per vaginam. She had also vomiting, on and off, for the last two months.

Previous history.—She had two children; the first was a forceps case and the child died; the second was a Cæsarean section about 7 years ago and this child died after 5 months.

Her periods were regular.

On superficial examination there was the scar of the Cæsarean section (lower median incision extending beyond the umbilicus on its right side). There were a few pin-point holes in the umbilicus but no probe could be passed. On vaginal examination the uterus was ante-verted, fornices very tender, but no mass was felt. There was tenderness in the appendicular region. On barium-meal examination nothing characteristic was noted.

On 8th February laparotomy was done. The uterus was found connected by a strong band to a loop of small intestine and from a little beyond this attachment a fairly big sized mesenteric band was connecting with the peritoneal surface of the umbilicus. The uterus was also adherent to the anterior abdominal wall. The band connecting the uterus to the intestine was divided at both the extremities. The band connecting the intestine to the umbilicus was also divided between the ligatures. The raw surface under the umbilicus was obliterated by bringing together the peritoneum on both sides.

She had an uneventful convalescence. Sutures were removed on the 10th. On the 25th February she had her periods through the normal passage, and was discharged cured on 3rd March.

A CASE OF GIARDIASIS

By H. S. ANDLEIGH, B.SC., M.B., B.S., D.T.M.

Resident Pathologist, Medical College, Agra

R. S., Hindu, male, aged 30 years, was admitted into the medical wards of the hospital on 5th March, 1942, for the following complaints:—

(1) Passage of mucus with stools.

(2) Constipation.

(3) Marked loss of weight—30 pounds in 1¼ years.

(4) Abdominal discomfort, specially below the umbilicus.

(5) Gurgling in the lower abdomen.

All the symptoms were for about 1¼ years.

Towards the end of the year 1940, he was stationed in a rural development dispensary in the district of Budaun, U. P. Once while on tour, he was by chance detained in a small village situated between the two currents of the river Ganges. There he had to depend upon the Ganges water for drinking purposes. He stayed there for three days and when he returned to his station, he felt a severe heaviness in his stomach with gradual and progressive constipation and loss of appetite. This condition continued for about a week when the constipation became very obstinate. He took a dose of saline which resulted in 3 to 4 motions. This purgation was followed by severe colicky pain which had to be relieved by two doses of atropine and morphine. This was followed by a period of quiescence of symptoms for about six months, except for mild abdominal pain and loss of appetite. He again got severely constipated for which he took a dose of castor oil, which resulted in several stools with large amounts of mucus, and were followed by a severe type of abdominal pain. This happened in the month of February 1941 and since then the passage of mucus with stools has been continuous. It increases now and then to a large amount. His stools were examined

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twice in the month of April, but nothing abnormal was reported. As he was rapidly losing weight, he got himself admitted to the Thomason Hospital for systematic investigation and treatment. I examined his stool here and found it full of cysts of *Giardia intestinalis*. Other examinations carried out here were as follows:—

(1) Opaque enema—cæcum and ascending colon have irregular outline and general mottling; no meal in the ileum.

(2) Gastric analysis—free HCl and total acid within normal limits.

(3) Sigmoidoscopic examination—nothing abnormal found.

(4) Blood picture showed only a slight degree of anæmia.

He was given a course of atebrin tablets, one tablet thrice a day for 5 days.

I again examined his stools on 17th March, and found no cysts of *Giardia intestinalis*. There was also no mucus in the stools. He has been relieved completely of his symptoms. His appetite has increased and he is no more passing any mucus with his stools. He has already started feeling much better and is gaining in weight; and I hope he is completely cured.

My thanks are due to Dr. G. N. Vyas, M.D., M.R.C.P., professor of medicine, for allowing me to report this case.

A CASE OF TETANUS

By MOHAMMED ASGHAR FAROOKI,
M.B., B.S. (Pb.)
School Medical Officer, Sialkot City

M. B., Muslim female, aged 25 years, wife of a doctor and sister of a doctor, on my friendly visit to her family on 6th April, 1942, told me that she had been having a slight temperature between 99° and 100°F. for four days. She had no other complaint except a little pain in the abdomen, especially in both subcostal regions. I told her not to worry, thinking that it was only an attack of sandfly fever.

The same midnight she woke up with a terrible pain in the abdomen under both costal margins and could not sleep. She was given potassium bromide, grains 15, followed by luminal grain 1/2, half an hour later, with no effect. An hour later, she was given morphia grain 1/6 and atropine grain 1/100 subcutaneously as a result of which she slept quietly.

7th April.—She was sleeping till late morning and was awakened with difficulty; she was quiet and drowsy, and answered questions slowly. Cold sponging of the face brought about only a little improvement. The pupils were normal and reacting to light. It was thought that this sleepy condition might be due to morphia and would pass off soon. For the little distension she had, she was given glycerine enema, pituitrin, and flatus tube with good effect. At noon she became stuporose and developed lock-jaw. Previous history and examination of the patient revealed no wound, injury or scratch on the body. She had been delivered of a male child three months back, by a dirty *dai* before the lady health visitor could arrive. In the afternoon she was absolutely unconscious. We were still pondering over the co-existence of lock-jaw and unconsciousness, when she got her first typical tetanic convulsion, followed by another in a few seconds. There was convulsion of the whole body with cyanosis, foaming in the mouth, *risus sardonicus*, and opisthotonos.

Anti-tetanic serum was given immediately, 30,000 international units intravenously and 30,000 international units intramuscularly. Lumbar puncture was tried but could not be done, due to severe opisthotonos and the parents did not like resorting to chloroform anæsthesia. Other general treatment was given in the shape of exclusion of foreign stimuli. Her temperature was 99°F., pulse 96, and respiration 24 per minute. Chloral hydrate, grains 30 and potassium bromide, grains 60, were given per rectum, which controlled the spasms in number and severity. We did not like to give more hypnotics, as by now the pupillary reflex had completely disappeared.

8th April.—Patient was still unconscious with no corneal reflex and no pupillary reaction. Feeble tetanic convulsions appeared occasionally. Temperature shot up to 104°F., pulse 122 and respiration 28 per minute. Hydrotherapy was done, which lowered the temperature to 101°F. Anti-tetanic serum, 15,000 international units was given intravenously and 5,000 international units intramuscularly. Ten c.cm. of 20 per cent magnesium sulphate solution, 25 c.cm. of 25 per cent glucose, and 5 c.cm. of 10 per cent soluseptasine, were given intravenously and were repeated six hourly. At noon she again developed severe convulsions (in spite of the deep coma she was in) which were controlled by morphia grain 1/6, hyoscine grain 1/100 and atropine grain 1/100 hypodermically. Respiration was quiet till evening when it became periodic and failing. All hopes were lost. In a desperate attempt to keep up the respiration, 3.4 c.cm. of coramine intravenously and 1.7 c.cm. intramuscularly were given. The improvement was marked and the respiration became normal in 15 minutes. Paraldehyde 2 drachms and ether 1 drachm in 3 ounces of olive oil were given per rectum at night, and there was no necessity to repeat it afterwards.

9th April.—The respiration was quiet, smooth and 26 per minute, pulse 140 per minute, and temperature 101°F. The heart sounds were weak and first sound softened. Digitalin grain 1/100 was given, anti-tetanic serum 20,000 units intravenously, soluseptasine and glucose were continued as before. Glucose saline per rectum was also given four hourly. The patient was still deeply comatose. Convulsions still appeared though mild. She died that evening as a result of circulatory failure.

Points of interest

1. Tetanus developed in a woman three months after delivery and there was no discharge per vaginam.

2. Although the incubation period was prolonged to as much as three months, the disease itself was of a very fulminating type.

3. Pain under both costal margins was probably due to irregular spasms of the diaphragm and appeared many hours before lock-jaw.

4. The mind was peculiarly cloudy to start with, but this soon passed into coma and she remained so throughout the course of the disease.

5. Coramine was most efficient in controlling respiratory failure.

6. Death was due to circulatory failure and exhaustion.

My grateful thanks are due to Dr. C. L. Sahni, M.B., D.P.H., D.T.M. & H., municipal medical officer of health, Sialkot city, for kindly allowing me to report this case.

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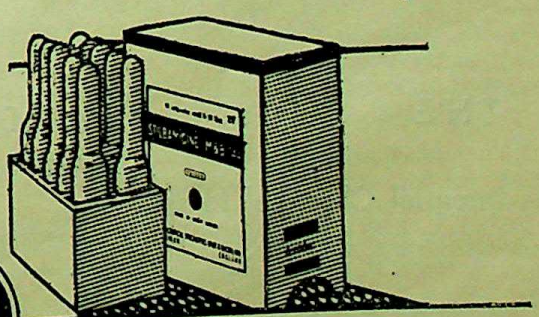

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Indian Medical Gazette

JUNE

AMŒBIASIS *SINE* DYSENTERY

THE word amœbiasis was used by some of the earliest investigators on amœbic dysentery —and it is usually attributed to Clegg and Musgrave—but it is only during the last twenty years, during the inter-war period, that it has come into common use, and that the general practitioner has become conscious of the potentialities of amœbiasis *sine* dysentery.

Let us consider what are the facts and what are the theoretical deductions regarding *Entamœba histolytica* and the lesions it produces.

(*i*) In the first place, its pathogenicity has been established beyond reasonable doubt; the trophozoite forms of the amœba are shown to be parasitic, and to ingest red blood and other tissue cells; these trophozoite forms are found buried in the tissues of the walls and bases of the ulcers, they are often the only living organisms in a liver abscess, and, whilst they are still there, the ulcers will not heal. Therapeutically, it has been shown that emetine has a direct action on these amœbæ, that when this drug is given parenterally to an infected person it acts on the amœbæ in the tissues and destroys them, and that in patients so treated the ulcers heal. Experimentally, the amœbic infection has been transmitted to man and certain animals, and typical lesions, from which the amœba have been recovered, have been produced, whereas it has been shown that in similar circumstances *Entamœba coli* will not produce ulceration of the colon.

(*ii*) Amœbic dysentery, together with its most serious complication, liver abscess, is a tropical and sub-tropical disease. Many cases have been reported amongst returned sojourners in the tropics and amongst their close associates in their homes in temperate countries, but very few instances of locally acquired sporadic amœbic dysentery or liver abscess ever occur in temperate countries, and, when they do, they are usually considered worthy of separate report in the medical press.

(*iii*) We know that minute ulcers may be present in the colon in the absence of clinical dysentery, or even of any other symptoms referable to the bowel. In these cases, *Entamœba histolytica* cysts will be passed in the stools, and active amœba will be found in the ulcers. There is considerable evidence that, although these ulcers may not produce dysenteric symptoms, they allow the entry of bacteria and/or of unchanged or partially-digested food substances directly into the blood stream, and thereby cause septic and/or allergic disease. The evidence in favour of this sequence of events gains much support from the fact that the administration of amœbicidal specifics will cause the disappearance of both the cysts from the stools and the patients' symptoms.

(*iv*) Emetine given parenterally will usually cure amœbic hepatitis dramatically and will arrest the process of abscess formation; it will also cut short the dysenteric process in its early stages, but in the later stages, when the patient is passing cysts only and also in the carrier, oral administration of emetine bismuth iodide, or other amœbicidal drugs, such as yatren or carbarsone, are usually considered to be necessary to eradicate the infection.

(*v*) *Entamœba histolytica* produces cyst forms that are now distinguishable by certain definite criteria from other non-pathogenic amœbæ that inhabit the intestinal tract of man.

(*vi*) World-wide investigations during the last twenty years have shown that not only do a large percentage of the inhabitants of the tropics and sub-tropics, and of soldiers and others who have returned from the tropics and sub-tropics, pass *E. histolytica* cysts in their stools, but that a considerable percentage of residents of temperate climates, Great Britain, Canada, and the United States, also pass morphologically identical cysts in their stools; in the last group, the percentage is variable and varies according to the degree of sanitary advancement of the area and of the community from which the individuals are drawn.

Faust (*Amer. J. Trop. Med.*, **22,** 93) has suggested that in the United States, on an average, 20 per cent of the population pass *E. histolytica* cysts in their stools.

So much for the facts: now it has been *deduced* from the above facts and other evidence that *Entamœba histolytica* is an obligatory parasite, that the presence of *Entamœba histolytica* cysts in the stools of an individual is definite evidence that that individual has small ulcers in his or her colon which are potential, if not actual, portals of entry for bacteria and/or allergens, that such persons are a potential danger to others and should never be employed as food handlers, and that they are themselves liable to suffer from the innumerable ills that have been attributed to these small ulcers, and also that if their resistance is lowered they may suddenly become victims of frank amœbic dysentery, and that they should therefore undergo a course of treatment for eradication of this infection.

How do these facts and deductions tally? We will first consider the last of the facts. What is the evidence that one in every five residents of the United States has small ulcers in his or her bowel mucosa? How often have these small ulcers been seen in the tens of thousands of *post-mortem* examinations that are performed annually in that country? It is suggested that these ulcers are very small and superficial and heal rapidly; even then they should be found quite frequently.

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Then the question arises, why, once having obtained a footing, should the amœbæ be so rapidly overcome by the local tissue resistance? Is it a matter of individual susceptibility? We can understand how in one person only small superficial ulcers are found, in another extensive ulceration, and in yet others the amœbæ reach the liver and cause hepatitis in one case and liver abscess in another, but why in one country should *all* individuals enjoy a high degree of immunity whereas in another they enjoy a varying amount? Is it a matter of racial immunity, or of the climatic factor? If the former, why does this immunity break down so readily when the same individuals go to the tropics, or in either case how can one explain the Chicago outbreak of 1933?

In this incident, 1,400 people, who had stayed in Chicago at one or other of two hotels which had a common water-supply that was later shown to be badly contaminated, developed acute amœbic dysentery and about 70 of them died. What suddenly happened to the immunity in these 1,400 people? And why if 1 in 5 of them already had a *histolytica* infection, was this super-infection from the water-supply necessary to precipitate an acute dysenteric attack?

Why under the various strains and stresses that man is subjected to does the resistance of these so-called *histolytica* 'carriers' practically never break down in temperate countries and produce frank dysentery and/or liver abscess? Even if we depart from the teaching of the protozoologist, and assume that *E. histolytica* can sometimes live as a saprophyte in the intestine of man, we still want to know what determines its invasiveness.

It is not clear why, if emetine given parenterally will destroy the amœba in the ulcers in a case of frank amœbic dysentery, it will not also destroy the amœbæ in the small ulcers in the carrier, and thus prevent the formation of cysts, and/or how drugs, such as carbarsone and yatren, which are designed to act on the pre-cysts forms of amœbæ in the lumen of the gut, also destroy the parent amœba buried in the tissues and thereby prevent further cyst formation; in the latter case, it is probable that they are absorbed and act *via* the blood stream just as emetine does, but, if this is so, why should they not then be equally efficacious in acute amœbic dysentery and in amœbic hepatitis; in the latter, they are certainly not.

Thus, the story as it is told in the textbooks to-day does not apparently present the whole truth. How can these apparent inconsistencies be reconciled?

One rather revolutionary suggestion is that the amœba is not the true causative organism, but only a secondary invader. This can, we think, be negatived, not only by the pathological evidence and the experimental work that has been done with this organism, but by the fact that so much ulceration of the bowel occurs on to which the ubiquitous amœba does not become engrafted.

Another suggestion is that a normally saprophytic amœba is stimulated in some way to become pathogenic, possibly by the synergistic action of some other micro-organism. There is, as far as we know, no experimental evidence in favour of this, but the ubiquity of the amœba and the limited distribution of amœbic dysentery could be explained on these grounds.

Finally, is it possible that we have accepted too readily the majority protozoological opinion regarding the identity of the cyst that is found in 1 in 5 of the stools of the inhabitants of the United States with the pathogenic *Entamœba histolytica* that causes amœbic dysentery and liver abscess in the tropices? The evidence is mainly morphological, but how far can we trust morphology? Confusion has reigned in the epidemiology of cholera until quite recently through failure to identify the true cholera vibrio; we might well be faced by a parallel position here. Many of the apparent anomalies could be explained on the assumption that there is a non-pathogenic race of amœbæ which produces cysts morphologically identical with those of the true pathogenic *Entamœba histolytica*, and that in the tropics we have both, whereas in temperate countries only the former is normally prevalent, although the latter may occasionally appear, *e.g.* the Chicago incident. At least, we feel, it is time that the subject was re-examined by the protozoologist.

The subject is one of much more than academic interest; in fact, it is one of vital importance to the clinician, for the list of diseases that are attributed to amœbiasis *sine* dysentery is already formidable and continues to grow. It includes all allergic diseases, many skin diseases, both allergic and septic, many chronic eye diseases and in fact the whole range of diseases in which a 'septic focus' is suspected as an ætiological factor. The physician who is groping about blindly for an allergen or septic focus finds the stool examination an easy and inexpensive procedure, and if his patient happens to be one of the 1 in 4 who passes *E. histolytica* cysts in this country (the incidence is higher than in the U.S.A.), he has found something positive and he either recommends a course of carbarsone or yatren, or ignoring modern teaching—or perhaps, questioning it as we have done above—he gives his patient six or more emetine injections—often, we fear, neglecting to warn him to rest during this treatment—or to make assurance doubly sure, he prescribes the double treatment. Now and then, this procedure, which is a perfectly rational interpretation of the amœbiasis-*sine*-dysentery hypothesis, appears to be brilliantly successful, for in this country we know that the dysentery-and-liver-abscess-producing *Entamœba histolytica* is prevalent and there is no question also that emetine has a non-specific beneficial action in hepatitis, but how often does

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it make not the slightest difference to a patient? In view of the high incidence of these cyst passers amongst the apparently healthy members of the community, have we any right to attribute so much ill to these cysts, or rather to their parent amœbæ, and to waste valuable drugs—of which an acute shortage is threatened—without more clinical evidence that they are indicated?

The pathologist complains quite rightly that the physician does not take full advantage of laboratory science and, for example, treats all anæmias with liver extract when 75 per cent of them would do much better with the far cheaper iron, but he should be sure that he himself does not sometimes mislead the physician into practising a pseudo-scientific quackery. In the matter of the significance of *E. histolytica* cysts, we feel that he cannot be too certain, and we therefore issue a plea for the re-examination of the whole subject, and for further experimental work if necessary.

Special Article

ALCOHOLIC BEVERAGES IN INDIA

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PART III

Physiological action of alcohol

ALCOHOL has the peculiarity of being absorbed from the stomach in considerable quantities. After administration of ordinary doses as much as 25 per cent is taken up from the stomach and the balance is absorbed from the upper part of the small intestines. It appears in the blood in 5 minutes after it is taken by the mouth, its concentration reaching the maximum in about 1½ hours and then slowly declining. The maximum concentration in the blood is somewhat higher than in other tissues. Even the kidneys have not the power of concentrating alcohol as its percentage in urine is about the same as that in venous blood. In those who are accustomed to its use nearly the whole quantity taken is broken up by the tissues, only about 2 per cent usually being excreted by the breath and urine, and not more than 10 per cent in any case. Concentration of alcohol in the blood can be approximately calculated by dividing the quantity absorbed, by the body weight. Strong alcoholic drinks produce somewhat higher concentration in the blood than diluted drinks. A concentration of 0.055 per cent in blood produces slight mental disturbance; marked symptoms appear even in habitual drunkards when the concentration reaches 0.25 per cent.

According to Clark (1937) 0.025 to 0.1 c.cm. in 100 c.cm. of blood produces euphoria, impaired speed and inaccuracy; 0.1–0.2 produces disorder of conduct, minor inaccuracies and slowing down of movement; 0.2–0.5 appeared to produce intoxication, coma and gross inaccuracy of motor reactions.

Tolerance to alcohol in those habituated to its use is due to tolerance in the central nervous system. It is feebler than that produced by other drugs. That the brain functions are modified in alcoholics is shown by the fact that sudden stopping in such individuals leads to delirium tremens, which is then checked by moderate doses of alcohol. The gastric mucosa and the liver do not acquire tolerance but undergo progressive degeneration. In chronic alcoholism all the body tissues are devitalized and the will power, moral sense and mental capacity are greatly impaired.

Two of the commoner fallacies that need to be discussed under this heading are the use of alcohol as (*a*) a stimulant and (*b*) a warming agent of the blood and tissues when taken after exposure to cold.

(*a*) *The use of alcohol as a stimulant.*—The popular belief pertaining to this particular effect of alcohol is precisely the opposite in its actual action. Alcohol acts primarily on the nervous system and its action is largely narcotic or sedative. The apparent stimulation is actually the direct effect of this narcotic which dulls the drinker's perception of his unpleasant feelings and makes him feel better. Effects such as increased loquacity and gesticulation, produced by alcohol, which are commonly attributed to its stimulant action, are also in reality narcotic effects resulting from the partial loss of the control exercised by the higher nervous centres. Ordinarily this control renders an individual self-critical and prevents him from the freer expression of his feelings. The removal of this control and the decrease of critical self-consciousness are, in fact, the most common and characteristic effects of alcohol, whether in a moderate dose, which diminishes restraint and 'nervousness' and imparts courage to the diffident speaker, or in larger doses when diffuse and incoordinated muscular movements of drunkenness are produced. The action of alcohol on the brain has been tested by a number of workers and they are all agreed that alcohol decreases the speed and accuracy of reflex response.

The popular belief that alcohol is a direct stimulant of the heart does not bear any scientific justification. Such value as it may have in heart diseases depends on its being a readily assimilable food, on its direct and reflex power to weaken the excessive check on the action of heart exercised by the nervous centres, and on its sedative influence on the higher centres of brain. The cumulative effect, inducing a sense of comfort and relief of mental anxiety, may be useful in selected cases of heart diseases, but it is actually the very opposite of stimulant effect. When an alcoholic drink appears to promote recovery from simple fainting it probably acts reflexly, like smelling salts, by virtue of its irritant effect upon the mucous membrane of the mouth and nose. Since the beneficial effect appears almost immediately and long before any appreciable amount of alcohol could have been absorbed and carried to the heart, the action must be local and indirect. The administering of spirits in the treatment of fits of unconsciousness is to be deprecated, for even in simple fainting alcohol is unlikely to do much good, and if the unconsciousness results from apoplexy or a head injury it may do positive harm.

The effect of alcohol on blood pressure is also of importance because of its supposed action as a circulatory stimulant. When administered by the mouth in concentrated form it stimulates the sensory nerve endings in the mouth and produces a reflex rise of blood pressure by exciting the vasomotor centre. After absorption, however, it produces dilatation of the blood vessels, particularly those of the vessels of the skin; this fact is probably due to its action on the heart-regulating centre, thus causing a lowering of the blood pressure.

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(b) *The use of alcohol as a warming agent of the blood and tissues after an exposure to cold.*—Alcohol depresses the activity of the heart-regulating centres and therefore acts as an antipyretic. The temperature of a person under the effect of alcohol can be more easily lowered than that of a normal individual. It is probably owing to this effect on the heart centres that alcohol causes dilatation of blood vessels of the skin and a subjective feeling of warmth. It is therefore more inadvisable to take it either before or during exposure to severe cold because, although it produces a temporary feeling of warmth and comfort, it diminishes the power of the body to conserve heat.

Alcohol is popularly believed to have a warming action on the human system when it is taken after a chill. It is to be emphatically stated that the so-called 'warming up' action of alcohol is not a physiological process and the sensation of warmth it causes is purely due to the flushing of the skin surface. This flushing does undoubtedly lead to relief of the unpleasant sensation of 'feeling cold', but this may itself, in some cases, be disadvantageous for, under exposure to cold, the unpleasant sensation urges the individual to protect himself suitably and thus assists the maintenance of body temperature by creating an impulse towards muscular exertion, so that the production of heat is accelerated. These effects of alcohol also form a part of the explanation of its supposed therapeutic value when taken in early stages of a common cold, but it may also have a more definite pharmacological action in such cases by assisting in the diffusion of blood to the vessels of the skin and thereby relieving partially the congestion of the internal organs, as well as promoting respiration. It must, however, be recognized that against the symptomatic benefits that may be derived from taking alcohol when the patient is in a warm bed at the outset of a 'cold', alcohol when taken habitually in excess decreases the body resistance to bacterial infection.

Pharmacological action of alcohol.—Alcohol has a stimulant effect on the taste nerve-endings, increases the flow of saliva and stimulates the psychic secretion of gastric juice. Flavouring agents in alcoholic beverages such as bitters in beer and etherial esters in spirits intensify these actions. Alcohol directly stimulates the functions of the stomach and in this way stimulates the secretion of gastric juice. Concentrated solutions of alcohol produce gastric irritation which, after a preliminary stimulation, lead to inhibition of secretion. Continued use of such drinks may produce chronic gastritis and total loss of acid from gastric juice.

The action of alcohol as a circulatory and respiratory stimulant is not powerful enough to be of any great therapeutic value.

Alcohol as food.—A large amount of experimental work has been done to show that the value of alcohol as food is very limited. It undoubtedly does enter the blood and is oxidized by the tissues at a constant rate, yielding energy, but the supply of energy is fixed and cannot be adjusted according to the needs of the body; it particularly cannot be increased to meet a sudden emergency nor can it be stored as a reserve. It also does not, unlike other foodstuffs, cause increase of basal metabolism.

Alcoholism as a cause of neuritis and cirrhosis of liver.—The researches of various American authors—Welsler, Minot, Strauss and Cobb, Joffe and Jolliffe and others—have shown that the form of peripheral neuritis which characteristically occurs in chronic alcoholics is not due, as was formerly supposed, to the toxic action of alcohol on the nerve tissues, but to the deficiency of the B vitamins, and especially of vitamin B_1, in the diet of the alcoholic. 'Alcoholic neuritis' is to be regarded as a nutritional disorder closely related to beri-beri, the more acute manifestation of vitamin-B_1 deficiency, which is seen in certain tropical countries. There is some evidence also that other morbid effects of chronic alcoholism, notably the gastric changes and the 'alcoholic heart', may be due, at least in part, to vitamin-B_1 deficiency. The action of alcohol in such cases is indirect rather than direct, but its rôle as an ætiological factor should not therefore be regarded as of small importance. The fact that the 'alcoholic' type of neuritis, and the related lesions, occur most frequently in chronic alcoholics cannot be disputed, and apart from their significance in regard to treatment, the main interest of the new findings lies in the light they shed on the actual method by which alcoholism may lead to harmful effects in the tissues. The process by which alcoholism may lead to vitamin-B_1 deficiency is still somewhat obscure; but among the factors responsible are probably decreased intake, due to the habitually poor appetite of the alcoholic, and to the fact that he can obtain his working energy from alcohol instead of from other foods, and possibly to increased utilization of the vitamin in such cases. The absorption of this vitamin may possibly be decreased on account of the catarrhal condition of the gastro-intestinal tract.

From the point of view of treatment, this new work has great value, for it has been shown that alcoholic neuritis formerly regarded as a very chronic and intractable disease, will in some cases respond quite rapidly to adequate doses of vitamin B.

Recent work has shown that cirrhosis of the liver is not due to the direct effect of alcohol on the parenchyma of the liver but it is in all probability due to its damaging effects on the intestinal mucosa, which leads to absorption of abnormal quantities of products of intestinal putrefaction.

Alcohol in health.—Taken in moderate quantities (*e.g.*, a large peg of whisky or a pint of beer) alcohol acts as a mild hypnotic and therefore renders the brain less active and less accurate; this effect may last for several hours. It reduces the accuracy of movements and eventually increases fatigue and the power of prolonged endurance to severe muscular exertion is reduced. As a food it is inferior to carbohydrate and fats and is a very expensive source of energy.

The consumption of alcohol in Great Britain has decreased enormously during recent years. The annual consumption per head was 4.54 gallons in 1900 and the convictions for drunkenness were 200,000 annually. In 1930 these figures had fallen to 1.98 gallons per head and convictions to 53,000.

Intoxicant effects of alcohol.—According to Clark (1937) symptoms of slight intoxication, recognizable without any special tests, commence when the blood concentration reaches 0.1 per cent or 1 mg. per c.cm. of blood or 0.125 per cent vol./vol. (as the specific gravity of alcohol is nearly 0.8). The quantity of alcohol needed to produce this result is shown in the following table (after Clark 1937):—

TABLE VII

Drink	Concentration of alcohol per cent vol./vol.	Quantity supply 60 c.cm. alcohol producing 1.0 mg. per c.cm. concentration in 50 kilo. individual
Whisky (35 degrees under proof).	37	160 c.cm. or 5 oz.
Port	2.0	300 c.cm. or ½ pint.
Natural wines ..	9–15	670–400 c.cm. or 1 to ¾ pint.
Strong beers ..	7	8.50 c.cm. or 1½ pints.
Light beers ..	4–5	1,500 c.cm. or 2½ pints.

It will be seen from this that country beers, which contain even smaller percentages of alcohol, will require 4 or 5 pints to produce intoxicating effects (Clark, 1937). Alcohol even in sub-intoxicant doses is

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probably one of the most important causes of motor accidents.

Are alcoholic beverages abused in India ?

Country beers. (a) *Tari.*—The harmful effects of the abuse of alcoholic beverages were realized from very early days. Tipu Sultan found drunkenness from *tari* so prevalent that he ordered all *tari* trees to be cut down. Sir Brown Ellis gave similar orders, for the same reason, with regard to date palm trees growing on the Government waste lands in Bombay Presidency. The Excise Commissioner in Bengal in 1884 found that much of the drunkenness attributed to outstills was really due to *tari.* Our own inquiries in parts of Bombay and Madras Presidencies, from old alcoholics, show that before the introduction of control, it was not uncommon to find the entire village, including men, women and children, drunk with *tari.* This state of affairs is sometimes met with even in these days in remote areas, in forests where Government control is not efficient, for instance, in the Agency Tracts of Madras, the Panch Mahals of Bombay and the areas inhabited by the Maria Gonds in the Chanda district of the Central Provinces. In certain parts of Bihar, which are populated by aborigines, and the mining areas of Bengal, there is a certain amount of difficulty in keeping women or servants sober.

(b) *Pachwai.*—Drunkenness due to drinking *pachwai,* which is a mild drink, also exists in certain parts of India. Some of the aboriginal races drink this beverage to a stage of intoxication, when they get an opportunity. Among the hill tribes in Chota Nagpur, Bengal and Assam there is a tendency to take large quantities of *pachwai* if it can be had ready-made in shops, but on account of the paucity of the supply of rice they do not manufacture it in their own homes. Drunkenness due to *pachwai* is not uncommon in the mining areas in Bengal and Bihar. The evidence in favour of *pachwai* being taken mostly for its nutritive effects is also not so strong as in the case of such beers as *zu* and *laopani,* as the rice in the former becomes unpalatable and bitter after fermentation, and is not consumed but thrown away.

Among the hill tribes in Assam the beers ordinarily consumed are weaker and the manner of their consumption is also different, the beverage being taken in the form of a thick gruel and rice eaten with it. It is a part of the dietary of the inhabitants of the whole range of hills right up to Tibet and Burma. These tribes, who have a fine physique and are hardy, use as much as 25 per cent of their rice crop for this purpose. This in itself is proof that this beer cannot be very harmful and probably is not abused. Drunkenness of a convivial nature, however, does occur among these tribes and many individuals may become incapacitated for days together after drinking bouts. Amongst the tea garden coolies the state of affairs is much worse and there is considerable drunkenness from this source. The coolies get so accustomed to the use of beers that they will starve themselves in order to get rice for brewing *laopani* or *zu.* In the United Provinces the evidence we have collected goes to show that excessive use of beer and drunkenness is confined chiefly to festive occasions. In Jaunsar taluk *pachwai* and *rabra* are chiefly used on such occasions as New Year's Day, Dewali and certain other festivals. In the Punjab, although evidence of drunkenness and even of debauchery was produced before the Excise Committee, *lugri* drinking usually is only conducive to merry-making of a harmless type. In South India beers are used to a much smaller extent, there being only one or two small areas where they are still consumed.

It has sometimes been urged that the use of such beverages should be totally stopped. On the other hand, there are authorities who think that any attempt to restrict their production would do more harm than good and would encourage drinking of stronger liquors or the resort to narcotics such as opium or hemp. The use of beer to the extent of producing uncontrollable intoxication is rare. Repeated doses of these beverages in excess may produce a state of intoxication similar to that commonly produced by stronger forms of alcoholic drinks. The accompanying recklessness of danger and the feeling of bravery induced in such cases is partly the result of the temperament of these more or less primitive races, and also in many cases it is due to a state of mental confusion induced by poisons such as dhatura, aconite and nux vomica with which the beers are not infrequently adulterated.

There is no doubt, however, that in a few instances drinkers of country beer intoxicate themselves, simply for the purpose of inducing a state of intoxication. These gross instances of producing motiveless drunkenness from country beer corresponding to the excessive drinkers of alcohol in the West; they are fortunately not common. Very large quantities have to be taken before such a condition can be produced, and this is often beyond the means of the drinkers.

Effects of different alcoholic beverages

We have analyzed the statements of individuals who were in the habit of regularly taking different forms of alcoholic beverages as to whether their general health was improved after their use or not. The following observations summarize the views expressed :—

(A) *Effects of* tari.—Over six hundred cases were examined in different parts of the country, taking different quantities of this beverage in different stages of fermentation. It was found that the intoxicating effects of *tari* were comparatively mild and that in 80 per cent of this series the stage of intoxication, if it occurred at all, lasted only for short periods not exceeding half an hour. The remaining 20 per cent (some

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of them being very reliable persons holding responsible positions) stated that the beverage had no intoxicating effect at all and that it was a wholesome, refreshing and invigorating beverage with marked nutritive properties. They believed it to be the least harmful of all the alcoholic beverages used in this country. Owing to divergence of opinion we decided to go into this question in more detail.

The term *tari* includes both the unfermented and fermented juice of all kinds of palm tree. According to an analysis carried out in the laboratories of the Bengal Government, its ordinary strength was found to be about 95°U.P., which can be compared to the weakest description of *vin ordinaire*. The Excise Commissioner of the United Provinces puts its strength at 98.1°U.P., and another authority repeats the assertion once made in the House of Commons that it is little stronger than home-made ginger beer. It must be presumed that in *tari*, fermentation sets in rapidly because the solution is favourable for fermentation and the pot in which the juice is collected is almost invariably coated with fermenting material. The rate of progress of fermentation varies according to the kind of palm tree tapped and the temperature at which it is kept. For instance, in cooler climates, the alcoholic content may be negligible or entirely absent after a few hours; while in warmer climates fermentation occurs rapidly, unless certain chemicals are used to prevent it, the most common method being coating the inside of the pot with lime. If the alcoholic content is low, the percentage of unfermented sugars is high, and vice versa. It appears, therefore, that opinions regarding the harmlessness of fresh *tari* are justified, so far as they relate to *tari* in which the fermentation has not commenced or has only slightly advanced. In the authors' opinion they relate to only 30 per cent of the cases examined, in the remaining 70 per cent careful enquiry showed that fermentation was far advanced or nearly complete. A series of analyses of these specimens of *tari* showed that the average strength in Bengal and Madras was 89.20 U.P., which compares well with almost all mild alcoholic beverages used in the West.

As regards the effects of other harmful ingredients, it was found that the ordinary *tari* consumed in shops contained, bulk for bulk, nearly the same proportion of fusel oil as an equal amount of spirit of 60 U.P.; this is nearly four times as much in proportion to the alcohol content. Besides alcohol these specimens contained a large proportion of acids, which are believed to be the chief cause of indigestion, diarrhœa, dysentery and rheumatism which accompany its excessive use. As regards their nutritive value, these specimens contained a fair amount of sugars and albuminoids. It would appear, therefore, that *tari* on the whole has low alcoholic content, and comparatively greater nutritive value than many of the other alcoholic beverages in use. The nutritive value, however, is of importance only in the case of moderate consumers of this beverage, who take it in a comparatively fresh state. When it is taken in large quantities, the percentage of some of the impurities consumed is much greater than would be the case if the same amount of alcohol was taken in the form of distilled liquors. It should be remembered that the nutritive factors are of little advantage to the consumer, who drinks in order to get drunk, and that large quantities of *tari* consumed have injurious effects. There is a popular saying that the confirmed *toddy* drinker soaks, he becomes bloated and lethargic, while the drinker of country liquor is soon under the effect of alcohol. There is moreover a large amount of medical and other evidence on record to show that considerable injury results from drinking of stale *tari*, which is described not only as a powerful intoxicant but, on account of its acid content, as highly productive of such metabolic disorders as gout, and is detrimental to health in other ways. Thus from observations in the field extending over prolonged periods in different parts of India, we are inclined to believe that the unfermented *tari* is the least harmful of all the beverages consumed in this country. If its use is in any way restricted, we have no doubt that people will be driven to more harmful beverages. In moderate quantities there is little harm; excessive drinking is very detrimental to health.

(B) *Effects of country beers (fermented beverage)*.—There is a great deal of difference of opinion as to whether country beers are wholesome or harmful. The effects produced by them are somewhat similar to those of ordinary malt beer, commonly used in the West. The immediate effects in habitual consumers are refreshing and stimulating; they alleviate fatigue and give rise to a sense of pleasure and general comfort (euphoria), accompanied by a feeling of vigour, and capacity for work. According to those who take them habitually, these beers remove restlessness, induce forgetfulness and soothe the nerves. Drinkers are at first inclined to be silent, but they soon begin to talk, become happy, courageous and even hilarious. They become sociable, the eyes brighten up and the usual depressing effects of alcohol on the higher centres become apparent. With larger doses the symptoms observed are similar to those seen after strong alcoholic drinks. As regards the production of harmful effects with these beers, our experience is very much the same as that of the witnesses who appeared before the Indian Excise Committee. These liquors are not always innocuous and sustaining as is sometimes claimed, and they undoubtedly lead to much waste of food material. Cases of excessive drinking are not uncommon, and even deaths have been recorded after heavy indulgence.

We have carefully studied the question of the fatal effects produced by the use of these

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beverages and have come to the conclusion that, even if inordinately large quantities are consumed, it would be difficult to take sufficient alcohol to produce stupor, coma or death from drinking the ordinary rice or *mandwa* beers. Most of the cases of poisoning were undoubtedly due to the use of adulterated or drugged beer. The allegation of adulteration of country beer has been made in most of the provinces and, although in the case of distilled liquors and *tari*, evidence has been wanting, it has certainly been obtained with regard to country beers. In quite a number of the fatal cases, *dhatura*, nux vomica or aconite have been detected in sufficient quantities to produce death by over-indulgence. Some of these poisonous substances have actually been detected in the fermenting cakes known as 'bakhar'. These drugs are surreptitiously added with the idea of giving the beverages a bitter taste and also with the object of increasing their intoxicating effects. From the data we have collected it is clear that habitués may be grouped into two classes with regard to the effects produced.

In the first group are included the tribes inhabiting Assam Hill Tracts right down to Burma, who use beer as an article of dietary or as a bland and mildly-stimulating drink. The Nagas, as we have stated, drink beer in lieu of water, and they are noted for their fine physique, in spite of drinking large quantities. We have not been able to detect any mental and physical deterioration in those who take such beer habitually.

To the second group belong those who use beer primarily for the intoxicating effects produced by the alcohol contained in them. To this category belong most of the races living in the plains and low-lying hill area which have a high rainfall.

Both classes undoubtedly contain a certain number of psycho-neurotic individuals who are unable to bear the strain and stress of life and resort to these drinks, but the number of persons among the tribes who use beer is very small indeed.

The witnesses who appeared before the *Indian Excise Committee* (Thomson *et al.*, 1907) expressed the opinion that even excessive use of these beers is less harmful than that of strong spirituous drinks, so long as the liquor drunk is not adulterated with deleterious substances. Bedford carefully studied the question of the alcoholic content and by-products contained in these beers. In point of by-products he found that they undoubtedly contain a high percentage of acidity and a much higher proportion of fusel oil. The quantities of furfurol present, however, was less than in country spirits. Beer drinkers, therefore, consumed comparatively small quantities of alcohol but very much larger quantities of the by-products. The general consensus of opinion was, and this is borne out by our own observations during recent years, that fermented liquors are very much less harmful in their effects than spirits containing a high percentage of ethyl alcohol.

A large amount of experimental work was carried out by Bedford (1906) and by Chopra (1927) on both animals and men, regarding the toxic effects of alcohol and the various by-products of fermentation. The conclusions arrived at by these observers are in accord. These are:—(*a*) That alcohol alone is at least as injurious as alcohol *plus* by-products; (*b*) that while the by-products are undoubtedly noxious and the amount far exceeds that found in potable liquors, in the relatively small quantities found even in the worst samples of the liquors analysed, their action would appear to be unimportant and negligible, and (*c*) that spirit-drinking is more noxious than the drinking of fermented liquors, because the amount of alcohol necessary to produce toxic effects is more quickly reached and more easily exceeded. Alcohol and not the by-products is chiefly responsible for the toxic effects produced by potable spirits. Any evil effects observed were attributable more to the excessive quantity of alcohol consumed than to any action of the by-products.

From the experimental data we have obtained and from our observations in different areas, we are in a position to state that these fermented liquors do not produce any special harm, when the concentration of alcohol is low and the consumption is not excessive. The age-long experience of the hill tribes in India points to the fact that fermented beers are on the whole less harmful than distilled spirits. The by-products are not harmful in the concentrations in which they are present in these liquors, unless very large quantities are taken for prolonged periods. During the course of our inquiry we have not found any greater preponderance of cirrhosis of the liver or any of the other conditions usually attributed to the excessive use of alcohol among these races, than are ordinarily found in races who do not use these liquors.

An altogether different factor, responsible for ill health in the consumers, is the insanitary conditions under which the beer is produced; the utensils used are not properly cleaned and impure water is often used in their preparation. To these facts might be attributed the occurrence of diseases such as dysentery, diarrhœa, cholera, tuberculosis, typhoid, etc. Finally it must be mentioned that beer after storage may taste stale and sour on account of bacterial contamination, when by-products, such as acetic acid and lactic acid, are formed in abundance. The harmful effects of these drinks, therefore, appear to be due to the unsatisfactory methods of preparation and storage rather than to the actual effect of alcohol contained in them.

(*C*) *Effects of stronger alcoholic beverages such as country spirit and other liquors.*—There is considerable difference of opinion with regard to the ultimate effects of alcoholic drinks on the human system. These differences are probably due more to the quantity and character of the particular liquor used rather than to error of observation or analysis. The wide range of environmental conditions and the personality types is clearly responsible for some of these variations. According to some authorities, who have observed alcohol addicts amongst the native population in India, the abuse of alcohol produces permanent ill effects and disease during periods varying according to the physical powers of the individual. The most common

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symptoms described are dyspepsia and emaciation in the case of country spirit, but fattening in case of beer, accompanied by diarrhœa, gastritis, cough, vertigo, cirrhosis of liver, neuritis, loss of mental power, tremors and some believe even epileptic type of fits. The chief alimentary disorders among those indulging in excessive quantities of alcohol are dyspepsia, gastritis and impairment of hepatic function. Congestion of liver and even fatty degeneration are not uncommon. No relation between chronic alcoholism and atrophic cirrhosis of the liver could be traced in our series of cases. We carefully examined the histories of all cases of atrophic cirrhosis and ascites in two of the largest hospitals in the Punjab. Only in very rare instances could any definite alcoholic history be traced. The cardio-vascular and respiratory systems are not markedly affected in chronic alcoholics in this country. In a series of 200 cases examined no marked changes were detected; the central nervous system undoubtedly bears the brunt.

Chronic alcoholics can be recognized in a number of ways. Many exhibit an unsteady gait and hasty behaviour, sometimes with an exaggerated degree of politeness. Excessive *tari* drinkers neglect their clothes, and their eyes are usually congested; the eyelids are swollen and œdematous in the same way as in nephritis. Some addicts described a wonderful feeling of exhaltation and physical strength. If the abuse is persisted in it leads to indigestion, wasting of the body, cough, depression, melancholia, impotence and finally dropsy. The individual is reduced to beggary and serfdom and becomes an outcast from society, and not infrequently his career terminates in insanity.

Mental disorders and alcohol

A statistical survey of such conditions has been made in the mental hospitals at Ranchi, Lahore, Madras, Nagpur and Yeravda. These observations were made by the authors in collaboration with the superintendents of these institutions, and the authors are grateful to these officers for the valuable help and suggestions given them in this work. The observations we have made show that abuse of alcohol is a causal factor in the development of insanity in many cases. There were altogether 875 cases labelled as toxic insanity in these hospitals, who gave history of alcoholism before their admission into the hospital.

1. *Minor mental disorders.*—Our observations in this connection were also made on habitual consumers who were not inmates of mental hospitals but were persons at large in the towns and villages. Most of them were doing their daily work and were earning their livelihood; a few even held positions of responsibility and trust. Minor changes in mental faculties may take place even from moderate habitual use of alcohol. The following are the common changes that have been observed :—

(a) *Minor impairment of mental faculties and judgment.*—In a series of 250 alcoholics examined, 20 per cent showed these symptoms. The degree of mental enfeeblement was sometimes so small that it was difficult to detect, but information could only be obtained through friends and relatives who could compare the past of the individual with his present condition and who could observe definite deterioration.

(b) *Progressive loss of memory.*—This was observed in individuals after 40 years of age, and in 15 per cent of this series such changes were discernible. These were associated with other senile degenerative changes such as arteriosclerosis, premature greyness, and diminution of sexual desire, etc.

(c) *Hallucinations and delusions.*—These were observed in 2 per cent of cases and were generally delusions of persecution. Auditory hallucinations were more common, and if care is not taken this may lead to paranoia.

(d) *Sexual depravity.*—This was met with in 4 per cent of the cases, most of the individuals being below the age of 30 who were given to life of debauchery. A gradually increasing suspiciousness and paranoid attitude develops with a pronounced increase in sexual excitement.

II. *Transient mania.*—The most common form seen in Indian asylums is an acute mania of short duration which was found in 10 per cent of cases labelled toxic insanity produced by alcohol. The onset is sudden and invariably follows a drinking bout; it is more common amongst persons who have a particular susceptibility to alcohol. There are instances on record where half a pint of country liquor rendered a person aggressive and violent with homicidal tendency. These persons sometime showed signs of exhaltation and a sense of well-being in the beginning, followed by restlessness, noisiness and disorderly conduct. There was a tendency to commit wilful damage, often followed by complete forgetfulness of the entire incident.

III. *Hallucinations.*—These were observed in 3 per cent of the cases of toxic alcoholic insanity. Hallucinations and delusions were of frequent occurrence, when alcohol was abused for prolonged periods. This condition could be distinguished from delirium tremens by the fact that it was mostly of a coherent type, and particular hallucinations followed particular delusions. The delusions seen were mostly of suspicion and persecution and often led to acts of violence.

IV. *Delirium tremens.*—This syndrome has been rarely observed in Indian alcoholics, although it is perhaps the most common of all the mental disorders attributed to abuse of alcohol in the West. The distinguishing features are presence of delirium and tremors which are rarely present together in any other disease. It is believed by some authorities that the syndrome is a withdrawal symptom of the drug during an acute illness. This belief is supported by the fact that rapid improvement often follows the administration of alcohol during early stages of the disease. Others believe that it is toxic in nature, as excessive indulgence in alcohol produces an antitoxin which enables tolerance to be established and that delirium is caused by an excess of this antitoxin. It has also been

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claimed that the serum of confirmed alcoholic addicts yields a toxin which is capable of producing delirium in dogs. The reason why delirium tremens rarely occurs among Indians is that it is only in very rare instances that such large quantities of alcohol as are imbibed by habitués in the West are taken by Indian habitués.

V. *Paranoic conditions.*—Four per cent of cases with history of alcoholism in the mental hospitals were labelled as paranoia (not true paranoia). The disorder starts with delusions of suspicion, and rapidly reaches a paranoic state. Hallucinations of hearing are frequent, and delusions generally referring to persecution by enemies. Such patients are often homicidal, and are very difficult to control. The duration of disease is usually shorter than in true paranoia. Dementia often follows and may change the picture to a considerable extent. Sometimes, when cases are mild and the drug is withdrawn early, the individual may become a useful member of society but he should be carefully guarded all the time. Most of these persons were below the age of 30 and were given to a life of debauchery and prostitution. A gradually increasing suspiciousness and paranoid attitude develop with a pronounced increase in sexual excitement.

VI. *Korsakoff's syndrome or polyneuritic psychosis.*—This is a toxic disorder which may also be due to other toxic factors such as diabetes mellitus, septic poisoning or chronic poisoning with metallic substances, such as arsenic, lead and mercury. Long-standing alcoholic intemperance is the most common cause of this disorder. The usual symptoms of the disorder are peripheral neuritis associated with the loss of memory for recent events. There may be extreme dissociation of thoughts and ideas. Alcohol probably influences both the cortical nerve cells and the peripheral nerve fibres, therefore the symptoms vary according to the region first affected. Not only memory but the self-critical faculty and sometimes the general intelligence suffers.

Alcohol in relation to crime

The relation between alcohol and incidence of crime was also studied by the present authors. In the central districts of the Punjab, for example, in Amritsar, Lahore, Gurdaspur, Ludhiana and Ferozepore, which are inhabited by Sikhs who consume alcohol in larger amount compared with other parts of the province, the incidence of crime is decidedly higher than in the rest of the province. Similarly, the incidence of crime rose in certain districts of the United Provinces and Madras and Bombay Presidencies, when the consumption of alcohol went up. Of all kinds of alcohol used in this country, it was found that country spirits were more instrumental in leading to a criminal mentality than any other kind of alcoholic liquors. Next in order come *pachwai,* foreign liquors and *tari.* We tried to trace a history of alcoholism among 150 addicts tried for murder in these areas, and found that country spirit was the contributary cause in 12.5 per cent.

As regards the relationship between alcohol and crimes of a sexual nature, it was found that, in 120 cases charged with rape and other sexual offences, there were 50 persons who frequently indulged excessively in alcohol. Criminals sometimes take to alcohol to overcome the sense of inhibition and the association of alcoholism with prostitution is often for the same purpose.

We have already referred elsewhere in this paper to the relation between mental disease and alcoholism. Insanity might lead to drunkenness, and *vice versa.* The typical crime committed in *mania a potu* is one of violence, and the terrifying hallucinations of delirium tremens might be responsible for murder, suicide, violent assault, or damage to property. In the more chronic forms of insanity, theft, fraud, and sexual offences were not uncommon. Crimes of violence might be due to hallucinations or to delusions. Sexual offence, thefts, embezzlement, or vagrancy might be caused by mental deterioration favoured by the abnormal mental condition produced by drunkenness apart from insanity. The impairment of reason, the lack of appreciation of the consequences, the emotional disturbance, the divorce from reality, the loss of inhibition, and the consequent unleashing of personal predilections were responsible for many crimes committed by alcoholics.

There was a tendency in some alcoholics to repeat their previous crime, thus resemblance might be accentuated if there were no subsequent recollection of the crime; and if an epileptic had taken alcohol before committing a crime, the diagnosis between alcoholic and epileptic automatism might be impossible. It is also important that after certain illnesses, such as head injury, brain disease, or a previous attack of mental disease (especially delirium tremens), the offender might be more susceptible to alcohol than formerly—the so-called pathological drunkenness.

REFERENCES

BEDFORD, C. H. (1906) .. *Report on the Quality of Alcoholic Liquors in India.*

CHOPRA, R. N. (1927) .. *Indian Med. Gaz.,* **62,** 195.

Idem (1927) .. *Indian J. Med. Res.,* **14,** 1005.

CLARK, A. J. (1937) .. *Applied Pharmacology.* J. & A. Churchill Ltd., London.

THOMSON, J., *et al.* (1907). *Rep. Indian Excise Committee,* 1905–06. Supdt., Govt. Printing, India, Calcutta.

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Medical News

PROFESSOR SIR RAM NATH CHOPRA AND GROWTH OF PHARMACOLOGY IN INDIA

ON 16th November, 1941, Professor Sir R. N. Chopra decided to retire from Government service and with this the long association, with Calcutta, and with Calcutta's premier medical research institution (School of Tropical Medicine), of a great pioneer figure in Indian experimental medicine came to a close. Besides being distinguished for his many notable contributions in his chosen fields, Professor Chopra will be long remembered as the 'Father of Indian Pharmacology' and a founder of a school of pharmacologists. Those with whom he came into intimate contact will never forget his magnetic yet simple personality, his high idealism, his unbounded enthusiasm and devotion for work, and, above all, his remarkable capacity to promote collaborative effort amongst various groups of scientists in extending the bounds of medical knowledge.

Chopra's academic background fitted him admirably for a career in the field of medical research. As a promising scholar of the Punjab University, Chopra so ably impressed his professors that his father was advised to send him after graduation to England for higher studies. Early in 1902, Chopra proceeded to England and enrolled himself in Downing College, Cambridge. Here he stayed for six years obtaining his Science Tripos in 1905, L.R.C.P., M.R.C.S. (Eng.) in 1907 and M.B., B.Ch. (Cantab.) in 1908. British medicine and physiology was at the zenith of reputation at this period under such internationally renowned exponents as Barcroft, Langley, Gaskell, Nuttal, Dixon, Horder, Clifford Albutt, Osler, Langdon-Brown, etc., and he had the good fortune of coming under the inspiring influence of some of these teachers. Deciding to take up medical research as his life's career, Chopra entered the laboratories of Professor Dixon and took up specialized study in that field of advanced physiology which deals with the action of chemical agents on biological tissues (pharmacology). Under the direction of the late Professor Dixon, he prepared a thesis entitled 'Action of drugs on ciliary movement in the respiratory tract', which later won him the degree of Doctor of Medicine in 1912. Knowing however that he will have to earn a living, and realizing the lack of full-time opportunities in scientific medicine in India nearly 35 years ago, Chopra entered the St. Bartholomew's Hospital while still enrolled at Cambridge, and towards the latter part of 1908, competed for the I.M.S. examination standing third in order of merit. As a young I.M.S. officer he saw active service first in East Africa and later in the Afghan War, for nearly 12 years. For a man of Chopra's temperament and keenness for research and academic work, it must have been a great relief when the School of Tropical Medicine was established through the untiring efforts of Sir Leonard Rogers and he was chosen to occupy the chair of pharmacology at this institution in 1921. After a roving life of well nigh 12 years, during which the only outlet for his genius was stereotyped medical and surgical practice in the army, luck and chance placed him in his real element and once he got his mooring, he stuck to it with his characteristic zeal and tenacity until his retirement 20 years later.

In 1921, pharmacology as a science was unknown in India. Excepting the sporadic efforts made by a group of workers to study the value of indigenous anthelmintic remedies under the guidance of Father F. J. Caius of Bombay, no systematic study on the basis of animal experimentation was being undertaken in any of the university laboratories or medical institutions. Pharmacology was not included as a subject for study in the medical curriculum of Indian Universities. It was therefore no easy task for Colonel Chopra to organize and equip a laboratory for modern experimental pharmacological work for the first time in India. As he used to admit freely to his students in later years, the task of arranging all details at the very outset of experimental work, where none had been performed before and where no practical guidance of any kind was available, offered difficulties which could not have been successfully surmounted but for the ready help of late Colonel H. W. Acton, C.I.E., I.M.S., then professor of pathology and bacteriology at the School of Tropical Medicine, and the advice and guidance from Cambridge of his professor, late Professor W. E. Dixon, F.R.S. His first paper on 'Therapeutics of Emetine' was published in 1922 in collaboration with Professor B. N. Ghosh (now professor of pharmacology at the Carmichael Medical College), more than a year later from the time he started work at the School, and this probably was the first paper published in India where the toxic effects of repeated doses of emetine injections on the cardiac musculature were demonstrated on experimental animals, and which, incidentally, served as the first note of warning in India against the dangerous practice of employing heroic doses of emetine in the treatment of all types of dysenteries and liver complications. Since then, a steady stream of researches on various aspects of tropical medicine, experimental pharmacology and therapeutics, drug addiction, indigenous drugs, drug standardization, clinical medicine, etc., emanated from Chopra's laboratory and Chopra spared no pains, whenever opportunity presented itself, in training up a band of young workers to carry on his field of studies.

Chopra's contributions to medical science cover a wide range of subjects. Space will not permit any detailed analysis or evaluation of his work. The main theme which seems to have attracted his attention early and to which he returned again and again was the study of Indian indigenous drugs—their chemical composition, the physiological action of their active principles on living tissues *in vivo* and *in vitro*, and the biochemical and bio-physical changes brought about in mammalian organisms on the administration of these active principles. The aim and scope of the work, as he conceived it as early as 1922, was as follows :—

'(1) To make India self-supporting by enabling her to utilize the drugs produced in the country, by manufacturing them in a form suitable for administration.

(2) To discover remedies from the claims of Ayurvedic, Tibbi and other indigenous sources suitable to be employed by the exponents of western medicine.

(3) To discover the means of effecting economy, so that these remedies might fall within the means of the great masses in India whose economic condition is very low.

(4) And eventually, to prepare an Indian Pharmacopœia.'

Such a comprehensive and ambitious approach to a complicated problem could not naturally be managed single-handed and Chopra realized from the very beginning, as Sir Leonard Rogers did, that collaboration with botany and chemistry was essential in tackling such problems. Here started a partnership between him and Professor S. Ghosh, professor of chemistry at the School of Tropical Medicine, which was destined to last all through his career at the School and which, like the partnership between Sir Henry Dale, P.R.S., N.L., and Late Professor G. Barger, F.R.S. of London, yielded very fruitful and far-reaching results in the field of Indian indigenous drugs. Practically all the indigenous substitutes that are now being used by medical practitioners in India in place of imported drugs may be said to be the outcome of the researches emanating from the Chopra-Ghosh school of workers. From scientific and academic viewpoints, the work on indigenous drugs has set up a high standard of medical and chemical research in India and has focused international attention to it. Its value from the economic viewpoint is no less

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worthy of note, as it has given a definite fillip to the Indian drug industry. Chopra's book on 'Indigenous Drugs of India' and 'Medicinal and Poisonous Plants of India' (2 vols.) will stand as lasting monuments of his enthusiasm and endeavour in a field which has seldom been trodden by scientific medical workers.

There was, however, another side of Chopra's interest in pharmacology which manifested itself in a large number of his published papers and in his books on 'Tropical Therapeutics' and 'Anthelmintics'. He was one of those, like the late Professor A. J. Clark of Edinburgh, who wanted to bridge the gap between pharmacology, therapeutics, and clinical medicine. He belonged to that group of scientists who were trained to study and appreciate the whole field of experimental medical science, particularly its 'applied' side as distinguished from 'fundamental and basic' concepts. Most of his work therefore leaned heavily towards studying problems of 'practical' utility to professional medical practice in the tropics. This is the reason why he moved his interest frequently from investigations pertaining to the field of tropical medicine such as asthma, lathyrism, epidemic dropsy, amœbic dysentery, helminthiasis, malaria, etc., to problems of drug standardization and adulteration, the scientific study of the effects of habit-forming drugs, *e.g.*, opium, cannabis, alcohol, chloral hydrate, cocaine, etc., on laboratory animals and human beings, the effects of chemotherapeutic remedies on mammalian system, the devising of laboratory tests for the diagnosis of kala-azar in outdoor clinics and in the field, etc., etc. In the apparent 'diversity' of topics dealt with by Chopra and in the very wide range of his scientific contributions, there is evident to critical observers a 'latent central theme' and that is, his effort to always interweave and interdigitate the work of the laboratory and the hospital. Though essentially a laboratory man with a preferential liking for experimental therapeutics, Chopra's later experience at St. Bart's Hospital, at the Carmichael Hospital for Tropical Diseases, and in the Army Medical Service rounded off his university training in pharmacology and served to extend his knowledge and interest to the science of disease as a whole, and he became ultimately a combined product of the laboratory and the clinic. Judged from this angle, Chopra's contributions are undoubtedly very significant and give clear evidence of the range and versatility of his mind.

The pioneer work of Chopra in building up Indian pharmacology, and in giving an impetus to medical and scientific research on 'applied' problems of peculiar interest to India, soon marked him out as an outstanding Indian in the field of medical research. One instance of his consuming desire to put India in the map of international medical and scientific research is provided by the fact that he never yielded to the attraction, so commonly seen in many foreign-trained scientists, of publishing his research papers in foreign journals. The writer recalls one instance when one of his British friends asked him to publish the results of one of his investigations in the *British Medical Journal*. Chopra politely wrote back saying that the *Indian Medical Gazette* would serve the purpose all right and he would send reprints to all the persons in England interested in that question. Chopra was fortunate in having an enterprising spirit coupled with admirable patience and grit, which made him an ideal administrator, a stimulating teacher and a sympathetic office-master. He exercised a great influence on many pupils, assistants and others who came in contact with him during the course of his long scientific career. None of the many who at one time or another were privileged to work in his laboratory failed to profit by his intense enthusiasm for research, his youthful outlook on science, his tremendous optimism even in the face of problems which seemed incapable of solution, and above all, his courteous dealings at all times with even his laboratory attendants. Despite his great absorption in his administrative and book-writing work in later years, the door of his room was always open to any worker in his or other laboratories of the School or to any former pupil or scientific friend. When one came for advice, one found a man who seemed to be working against time, but nevertheless, prepared to stop to listen to him attentively and give whatever advice he could to a younger assistant or colleague. In this way and by other sterling qualities of the head and heart, Chopra unconsciously served to build up a school of Indian pharmacology in the comparatively short space of 20 years from almost nothing but descriptive materia medica and non-scientific teaching of older days. If Chopra did not do anything else but this, his name would remain to posterity. As 'Father of Indian Pharmacology' in India, Chopra's position may be compared to those of Oswald Schmiedeberg of Germany and John Jacob Abel of America. Professor Schmiedeberg*, who is credited with the establishment of the first properly equipped pharmacological laboratory in a University, had nearly 40 pupils who occupied important chairs in almost all countries of Europe and America. The international character of the school developed by him can be judged from the following representative pupils :—Abel (Michigan and Hopkins), Meyer (Vienna), Magnus (Utrecht), Gottlieb (Heidelberg), Heffter and Heubner (Berlin), Cloetta (Zurich), Pohl (Prag), Morishima (Japan), Maogori (Padua), Cushny (Michigan, London and Edinburgh), Baldovi and Gaglis (Rome), Mosso (Genoa), Poulsson (Christiana), Bock (Copenhagen), Santesson (Stockholm), Kobert (Dorpat), Harnack (Halle), Dresser (Elberfeld), Wallace (New York) and Stockman (Glasgow). Professor Abel is also credited with training nearly 25 pupils who are now teaching pharmacology all over America, Japan, and Korea. During the last 20 years, Chopra had succeeded in developing an all-India School of Pharmacology and had, in collaboration with Professor S. Ghosh, trained more than 45 workers in the chemistry and pharmacology of drugs including indigenous drugs. A few names would indicate the representative character of the school developed by him :—Professor B. N. Ghosh (Calcutta), Paranjpe (Bombay), Nanda (Lahore), David (Madras), Iswariah (Andhra), Dikshit (Bombay), P. De (Calcutta), Venkatachallam (Madras), Grewal (Lahore), Chakravarty (Agra), Das (Nagpur), Mukerji (Calcutta), Sharma (Amritsar), Gupta (Calcutta), I. C. Chopra (Kashmir), B. C. Bose (Calcutta), Ratnagiriswaran (Madras), Chowhan (Meerut), N. K. Bose (Delhi), Chatterjee (Calcutta), G. S. Chopra (Karachi), Miss Chaudhuri and Miss Vethavanum (Delhi), Dutt (Calcutta), Kahili (Rangoon), Muthanna (Karachi), A. Chatterjee (Darjeeling), N. De (Bangalore), etc., etc.

Honours, both in appreciation of his contributions to medical science, and for all his activities in connection with medical and public health organizations and in connection with the initiation and development of the drug control organization in India, came to him from all quarters—from his *alma mater* (Cambridge University), from the University of Calcutta and other scientific bodies in India, Great Britain, Europe and America, and from the Government under which he served for a long period. When he retired last November to take up the duties of the Director of Medical Services and Drug Research in Jammu and Kashmir State, his hair was seen to be grey but his head remained as before—still sympathetic and approachable, still keen to work in his chosen field of Indian drugs as long as physical powers would permit, never to flag until Nature would demand it. It did not fall to his lot to make epoch-making discoveries, but his was the glory of a pioneer 'blazing the trail' in a field (study of indigenous drugs) so far untrodden and neglected in India but, nevertheless, a field pregnant with possibilities. A worker in his very core, Chopra's many pupils, friends, and acquaintances cannot help

* Festschrift to Professor Schmiedeberg. *Archiv. f. exper. Path. u. Pharmakol,* 1908 (Supplementary volume).

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but feel the loss of his genial company and inspiring leadership, but can be reconciled to it by his long life of accomplishments and by the fact that he is still happily 'in harness' in a better climate at the Kashmir State and is actively engaged in building up another research centre in Northern India.

B. MUKERJI.

MALE NURSES FOR MILITARY HOSPITALS

THE Government of India have decided to recruit 'male nurses' for employment in military hospitals during the present emergency. These men will be enrolled as warrant officers, class II, in the Indian Medical Department.

Men offering for this service must be registered as 'male nurses' with a provincial nurses registration council. Persons in government service, who wish to volunteer, will also be eligible.

Besides salary and allowances, men employed as 'male nurses' will be entitled to free rations and accommodation.

THE TUBERCULOSIS ASSOCIATION OF INDIA

TUBERCULOSIS NEWS

Hassan Masud Suhrawardy Memorial Anti-Tuberculosis Challenge Shield Competition

ENTRIES for the Hassan Masud Suhrawardy Memorial Anti-Tuberculosis Challenge Shield Competition on the basis of work done by the respective tuberculosis organizations during the year 1941 have been invited up to the 15th July, 1942.

The competition is open to any corporation, municipal council, municipal committee or district local authority in British India or in an Indian State doing anti-tuberculosis work or to any other organization, private or aided, which is doing anti-tuberculosis work and which the central committee of the Tuberculosis Association of India may from time to time admit to be eligible for the competition.

In awarding the shield full consideration will be given to the efforts made and results achieved in the prevention of tuberculosis during the year 1941.

The winning body will be entitled to hold the silver shield for one year, and its name will be inscribed thereon.

Special Tuberculosis Number of the 'Indian Medical Gazette'

At the request of the Tuberculosis Association of India, the editor of the *Indian Medical Gazette* has agreed, as in the past, to publish a special tuberculosis number of the *Gazette* in October this year. This will be published on the lines of previous numbers issued since the year 1937.

Articles on any aspect of tuberculosis—clinical, medical or preventive—for the forthcoming number have been invited from tuberculosis workers by the middle of July.

Lady Linlithgow Sanatorium, Kasauli

The following have been appointed members of the sanatorium managing committee for one year:—

The Chairman, Tuberculosis Association of India.
The Vice-Chairman, Tuberculosis Association of India.
The Honorary Treasurer, Tuberculosis Association of India.
Mr. D. N. Mitra, C.B.E., Solicitor to the Government of India.
Mr. U. N. Sen, C.B.E., Managing Director, Associated Press of India.
Sardar Bahadur Teja Singh Malik, C.I.E., I.S.E., Chief Engineer, C. P. W. D.
Major-General J. Taylor, C.I.E., D.S.O., I.M.S., Director, Central Research Institute, Kasauli.
Mr. D. D. Anand, M.A., Executive Officer, Kasauli Cantonment.
The Medical Commissioner, Tuberculosis Association of India.

Medical Commissioner, Tuberculosis Association of India

Dr. C. Frimodt-Möller, the first Medical Commissioner of the Association, had unfortunately to resign his appointment owing to failing health at the end of March 1942.

Dr. Frimodt-Möller was on medical leave since the 11th of August, 1941, and Dr. P. V. Benjamin, Medical Superintendent of the Union Mission Tuberculosis Sanatorium, officiated for him for about five months from the end of October last.

The affiliated provincial and state tuberculosis associations have been asked to recommend names of suitable candidates for the post. The candidates are expected not only to have the necessary academic qualifications in the special subject but should also have had wide experience in both the administrative and clinical fields.

New Tuberculosis Institutions

Her Excellency the Marchioness of Linlithgow laid the foundation stone of the Lady Linlithgow Tuberculosis Hospital, Patiala, on the 3rd March, 1942.

ROSE HIPS FOR ORANGES

TWO HUNDRED tons of rose hips gathered from the hedges of England and Scotland last autumn have been turned into syrup for the older children in Britain who cannot get a regular supply of oranges.

Like the orange, rose hips are a rich source of vitamin C, the anti-scurvy vitamin.

Before the war it never occurred to anybody to use rose hips, but when the supply of oranges dwindled a small army of Boy Scouts, Girl Guides, teachers and Women's Institute members turned out into the lanes with their baskets.

Even housewives who were expert jam makers found it difficult to keep the hip hairs out of the syrup and the hips were therefore sent off to nine factories which have now produced from them 600,000 bottles of syrup. Young children are sipping it with relish at the rate of one teaspoonful a day. Two teaspoonsful in the twenty-four hours give all the vitamin C which older boys and girls require.

Britain's Ministry of Health are so pleased with the result that they are hoping for a much bigger collection of rose hips when autumn comes round again.

RHEUMATISM IN CHILDHOOD AND ADOLESCENCE*

WE are pleased to receive a copy of this reprint. It is an outcome of an endowment founded to commemorate the memory of Dr. Elizabeth Mathai—such endowments for furtherance of medical science are relatively few in Indian Universities. The subject is well chosen, in view of the condition that the lectures should be definitely connected with some aspect of diseases of children and women. This series of three lectures, apart from confirming the established fact about the prevalence of rheumatism in this country, presents the available local material admirably, and insists on the importance of early detection of cases and their organized supervision.

*Rheumatism in Childhood and Adolescence. By P. Kutumbiah, B.A., M.D., M.R.C.P. (Lond.). (Reprinted from *Indian Journal of Pediatrics*, Vol. VIII, Nos. 30 and 32, 1941.)

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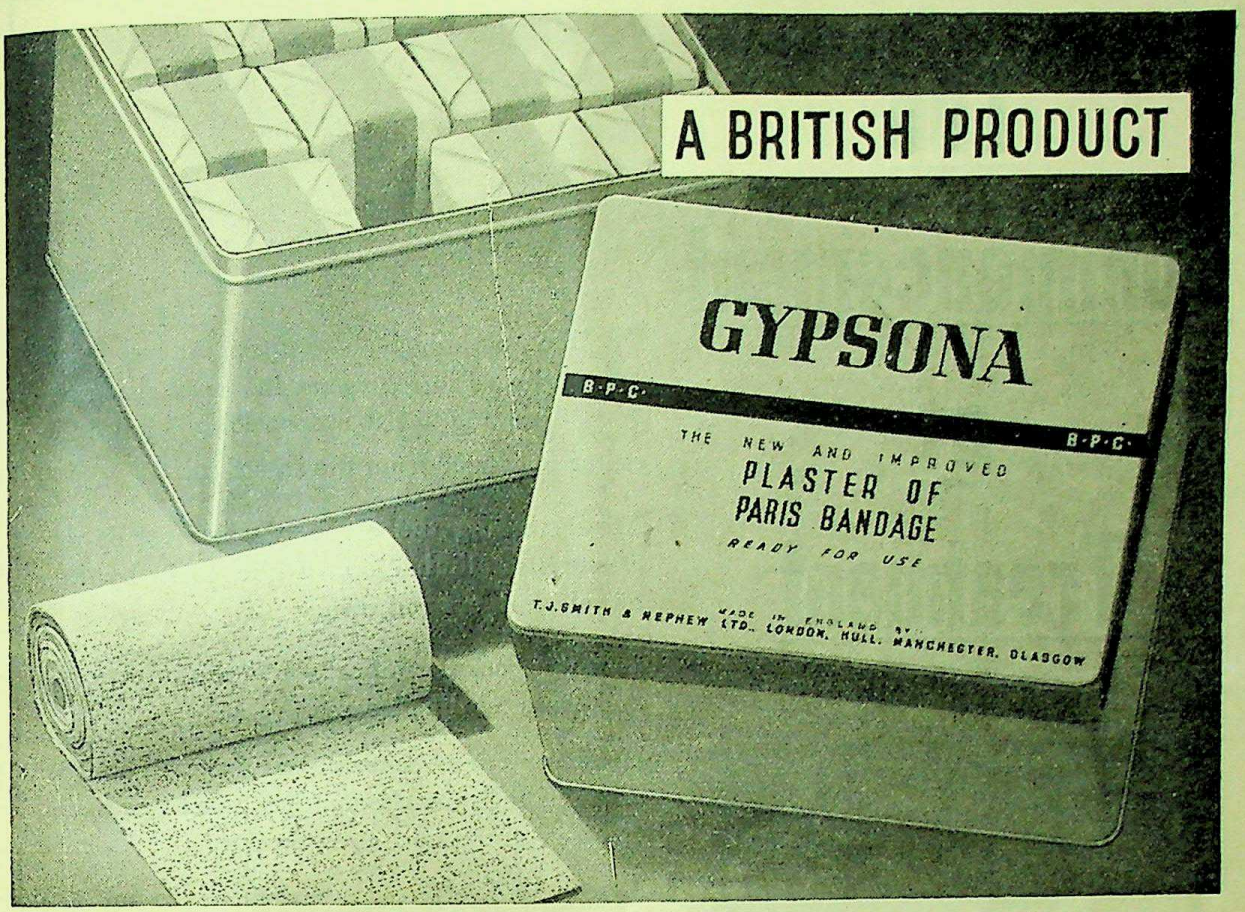
G.I.



A new and improved Plaster of Paris Bandage

T. J. Smith & Nephew, Ltd., the makers of 'Elastoplast' Bandages and Dressings, have pleasure in announcing to the Medical Profession the availability of Gypsona Plaster of Paris Bandages.

These Bandages, which are playing an indispensable part in the modern treatment of fractures, consist of fabric thoroughly and uniformly impregnated with plaster of paris by a new process, which ensures that every bandage is perfect. Gypsona contains 90% of plaster by weight, and there is no loose powder. It requires only about 10 seconds to moisten and sets hard within about 10 minutes of application.

Gypsona Bandages are specially packed for hospitals, in tins of 12 bandages, as illustrated, or for private practice in individual tins. Available in widths from 2″ to 6″ in 3 yard lengths.

Despite war conditions it is expected that reasonable supplies will be maintained.

For further particulars please apply to our agent :—

Ralph Paxton, Mercantile Buildings, 10, Lall Bazar, CALCUTTA

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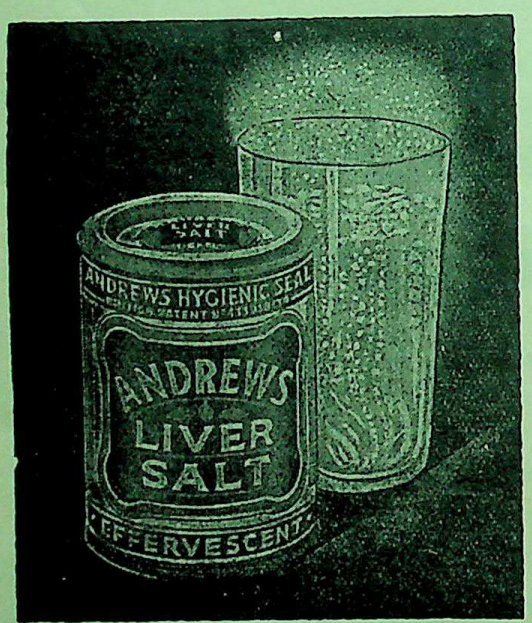
The Commencement of Treatment

THE pathological changes observed in the various organs in most diseases are due to the absorption of poisons, either locally or from the intestine.

After treating the cause, the next step is essentially elimination of the toxin by the bowels, kidneys and skin.

This is especially important in the infectious and acute febrile diseases.



It is sometimes overlooked in chronic diseases such as rheumatism, catarrhal diseases and skin diseases, etc.

A safe and efficient aperient is found in Andrews Liver Salt. Palatable to young and old alike, antacid in action, it is especially useful in febrile conditions, where its effervescing properties relieve thirst and cool the dry, parched mouth.

The tin in which Andrews is packed has proved to be the most suitable container in all climates. It is air-tight in order to preserve the contents in perfect condition, and the moisture-proof seal also safeguards the contents from tampering.

A large size tin will be sent free, on request, to any member of the Medical Profession. Apply to the Distributors: J. L. Morison, Son & Jones (India) Ltd., P. O. Box 258, Bombay, and Branches.

ANDREWS

LIVER SALT

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Public Health Section

THE HEALTH STATUS OF A BENGAL VILLAGE: ALL-INDIA INSTITUTE OF HYGIENE AND PUBLIC HEALTH STUDENTS' SURVEY*

FOR the past three years the D.P.H. students of the All-India Institute of Hygiene and Public Health, Calcutta, have been carrying out a survey of the health conditions of a rural Bengali community, including such data of socio-economic significance as can be included within the limitations of a period of five days. The survey has a twofold purpose: (*a*) to train the students in survey methodology including collection, analysis and interpretation of data, and (*b*) to give opportunity for the students to secure some first-hand acquaintanceship with rural conditions. A survey was made of Ratanpur in February 1942 and the essential data collected by the students are summarized below :—

Physiography

The village Ratanpur is 22 miles from Calcutta and is situated to the north-east of Singur in the Hooghly district. The village itself has developed in a ribbon fashion along the foot-path connecting Singur to Chandernagar and extends over nearly a mile and a quarter. There is no planning either in house-building or in village extension. The river Damodar situated about 14 miles to the west of the village and the river Hooghly situated about 9 miles to the east, run from North to South. The natural drainage of the tract has been interfered with or impeded by the following factors:—

(1) The silting up of the connecting channels, *viz*, the Kananadi, Kana Damodar between the Damodar and the Hooghly and of the river Saraswati.

(2) The construction of the left embankment of the Damodar and other embankments in connection with the railways and roads.

With the decay of the river system there was an urge for the construction of the Eden Canal for supplying people with drinking water. This canal with its distributary system was modified later for the purpose of irrigation as well. One of such distributaries connecting the Kananadi with the Saraswati, runs through the Ratanpur village. But it has failed to serve both the purposes mentioned above.

Climatology

The climate of the place is similar to the major part of the Western Bengal. The year can be divided into three distinct seasons—winter, summer, and the rainy season. Winter lasting from November to February is pleasant with little rainfall. During the summer months from March to June the temperature varies from 80°F. to 105°F. but the humidity does not fall below 60 per cent. The average annual rainfall is 59 inches, much of it occurring between July and October when the humidity is as high as 90 per cent.

Water supply

Water supply can be grouped into two headings: (1) for irrigation, facilitated to some extent by the Eden Canal; (2) for domestic purposes. Water from the *dobas* and from the dying tributaries is also utilized for irrigation.

For domestic purposes water is obtained mainly from two sources. The four tube-wells in the village, of which one requires immediate repair, supply water for drinking purposes while the numerous *dobas* are used for ablution, bathing, washing and also for cattle. Approximately each tube-well serves a population of 250, which is adequate under normal conditions; but in view of the ribbon development of the village, people have to go a long way for obtaining drinking water. Two new tube-wells were constructed by the students themselves during their survey and fitted with pumps and impermeable aprons and platforms and should alleviate to some extent the difficulty in getting good drinking water supply. The water in the Eden Canal is also used by those living near it, as others use *doba* water.

There are three dug-wells in the village of which one is *pucca*. Water from these is used both for drinking and other domestic purposes. No bacteriological examination was done to determine the quality of water from the tube-wells and the dug-wells.

Disposal of excreta

There are two houses with latrines of which one has a hand flushing closet with a septic tank. These are only used regularly by the female members of the house. There are no public latrines except for the two bore-hole latrines constructed by the D.P.H. students. The animal excreta, valuable as manure, are usually dumped in a corner near the house and converted into cakes for use as fuel.

Disposal of refuse and garbage

The refuse and garbage from the houses and cattle-yards are collected and heaped in manure-pits behind the houses. These pits are fairly distant from living quarters so as not to cause any nuisance to the inmates. Though there is no public agency responsible for the disposal of

*Arranged by Dr. C. Chandra Sekar and Dr. B. Mukerjee, of the Section of Epidemiology and Vital Statistics.

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refuse, one is struck by the general cleanliness of individual houses.

Housing conditions

Fifty-seven houses were surveyed for their conditions regarding (1) openness, (2) approach, (3) materials, (4) cleanliness, (5) dampness, (6) over-crowding, (7) ventilation and lighting, (8) kitchen and food, (9) bathing and washing facilities, (10) refuse collection and disposal, (11) latrine accommodation, (12) water supply and (13) other defects including nuisance from live-stock, flies, etc. The standards used for appraising the various items were purposely made lenient on account of rural conditions and even then only one house out of 57 could be classed as 'satisfactory' in every respect. However, the houses were not equally defective with regard to all items. With regard to openness, approach, materials, cleanliness and over-crowding at most only 25 per cent houses were below standard.

Most of the houses have open spaces, and are detached or semi-detached with fairly good approaches. The walls are massive and are either built wholly of mud or of mud over bamboo frame-work. The roofs are thatched. Few houses are white-washed. The floor is also of mud, well raised above the surrounding ground yet about 25 per cent of the houses are reported to be damp during the rains. Although most of the houses are provided with sufficient windows for ventilation, the lighting is poor due to the absence of white-washing of the walls. The kitchens are generally separate from the living rooms. Invariably the kitchens are well-kept and food is kept covered. Bathing and washing facilities are almost non-existent inside houses. The same applies to drinking water supply. Most of the houses have cattlesheds on the premises which are kept fairly clean. Pigs and poultry are not found in the houses. Though manure-pits are not close to the houses, fly breeding is prolific especially in wet weather. Mosquitoes are found in plenty especially in cowsheds and many villagers use mosquito-curtains.

Vital statistics

The population of the village at the time of survey was 1,071, the population 6 months before the survey as estimated by the natural increase method and used for the calculation of rates being 1,054. The population density works out to 5.4 persons per acre, reckoned on the area of Ratanpur, excluding only the paddy fields.

The age and sex distribution of the village compared to that of Bengal according to the 1931 census is given in Table I.

The crude birth rate for the year preceding the survey was 49.5 *per mille* and resident birth rate 48.5 *per mille*. The birth rate is much higher than that of Bengal which according to the D.P.H.'s report for 1939 is 32.0 and which even after allowing for incomplete registration of births cannot be much more than 42.0 *per mille*. Considering the fact that women in the reproductive age group at Ratanpur are lower than those in Bengal, the higher birth rate reflects on the higher fertility rate of the women in this village. It is not, therefore, surprising that the general fertility rate for women of 12 to 50 years of age works out to 209 *per mille*.

The crude death rate of the village is 18.03 *per mille* and the resident death rate 17.07 *per mille*. It should be observed that in spite of a larger proportion of individuals below 10 years of age and over 40 as compared to Bengal, the crude death rate of the village should be actually lower—the crude death rate of Bengal in 1939 being 21.9 *per mille*.

The low death rate and high birth rate lead to a high value for the vital index which is 284 for the village compared with 147 for Bengal in 1939.

TABLE I

Age group in years	Ratanpur				Bengal			
	Number		Percentage of total		Number in '000s		Percentage of total	
	Males	Females	Males	Females	Males	Females	Males	Females
0–1 ..	27	21	2.52	1.96	847	851	1.66	1.67
1–5 ..	76	56	7.10	5.23	3,077	3,168	6.03	6.20
5–10 ..	84	96	7.84	8.96	3,633	3,227	7.11	6.32
10–15 ..	70	51	6.54	4.76	3,178	2,840	6.22	5.56
15–20 ..	48	46	4.48	4.30	2,325	2,592	4.55	5.07
20–40 ..	143	147	13.35	13.73	8,799	7,989	17.22	15.64
40–60 ..	77	67	7.19	6.26	3,813	3,056	7.46	5.98
60 and over	29	33	2.70	3.08	885	806	1.73	1.58
TOTAL ..	554	517	51.72	48.28	26,557	24,529	51.98	48.02

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The infant and neonatal mortality rates of the village as compared to Bengal are as follows:—

	Ratanpur	Bengal (1939)
	per mille	*per mille*
Infant	78.4	146.6
Neonatal	39.2	86.3

The above rates for the village are based on small numbers and as such *much reliance cannot be placed on them for comparative purposes.* Yet the low figures for infant mortality do arrest attention, especially as only 4.2 per cent deliveries receive the attention of certified midwives whereas 85.0 per cent are conducted almost completely by the conventional *dais* and the rest are supervised by relatives and friends.

Judging from the pregnancy history of the women in the village, the still birth rate is 38.3 per 1,000 live and still-births (39.8 per 1,000 live-births), the rate for Bengal in 1939 being 41 per 1,000 live-births. Abortion rate is 7.5 per 1,000 pregnancies.

The specific mortality rates by age groups are as follows:—

Age groups	Rate *per mille*	Age groups	Rate *per mille*
Below 1 year ..	78.4*	20–40 years ..	14.0
1–5 years ..	30.3	40–60 „ ..	14.1
5–10 „ ..	16.9		
10–20 „ ..	0.0	60 and over ..	32.8

*Infant mortality rate.

The specific mortality rates by causes are:—

Causes	Rate per 100,000	Causes	Rate per 100,000
Typhoid ..	284.6	Chickenpox ..	94.9
Dysentery and diarrhœa.	284.6	Pneumonia ..	94.9
		Diphtheria ..	189.8*
Tuberculosis ..	189.8	Others ..	664.1

*1,111.1 per 100,000 for children under 5.

There were no deaths due to cholera or smallpox during the year under discussion. Diarrhœa and dysentery and enteric group of diseases are the commonest causes of death. These and malaria are also common causes of sickness as brought out by the following table giving morbidity rates :—

Morbidity rates per 100,000 population:—

Causes	All ages	Children under 5
Cholera	189.8	..
Typhoid	1,518.0	..
Pneumonia	284.6	..
Smallpox	284.6	..
Chickenpox	94.9	..
Dysentery and diarrhœa ..	1,043.6	..
Tuberculosis	284.6	..
Other respiratory diseases ..	94.9	..
Malaria	2,941.2	..
Ankylostomiasis	189.8	..
Diphtheria	284.6	1,666.7
Whooping cough	94.9	555.6
Measles	284.6	1,666.7
Others	4,838.7	..

The intestinal diseases are responsible for about 23.7 per cent of the morbidity figures. This high incidence is no doubt to be attributed to the unrestricted pollution of water sources especially *dobas* and to the absence of fly-control measures. The gravity of this problem is further brought out by the results of stool examination for hookworm ova by salt-floatation method in which out of 400 samples 233 were positive. The hookworm infestation was manifested equally by both sexes.

Though there were two cases of cholera and three of smallpox there were no deaths from these causes.

Health of the community

A general health examination was made and the individuals classified into four categories: (1) well, (2) acutely ill, (3) chronically ill, and (4) indifferent health. All persons whose state of health permitted them to carry on their normal duties efficiently were classified as 'well' while those who complained of vague ill-defined ailments which though not holding them back from their work yet interfered with the proper execution of it were classed as being in 'indifferent' health. The terms 'acutely ill' and 'chronically ill' were used in the accepted sense of the terms. The result of the examination showed that 87.6 per cent individuals were well, 0.4 per cent acutely ill, 0.8 per cent chronically ill and the rest 11.2 per cent in indifferent health. Both amongst males and females 88 per cent. were well. The percentages of persons classified as well, in the different age groups, are as follows :—

Age groups	Percentage well	Age groups	Percentage well
0–1 ..	77.1	20–40 ..	91.4
1–5 ..	85.6	40–60 ..	84.7
5–10 ..	91.1	60 and over	79.0
10–20 ..	88.8		

The above figures indicate that more than one-tenth of the community is either acutely ill or in

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indifferent health at any given time, infants and old people being the worst sufferers.

Examination of the condition of the heart showed that in 96.5 per cent individuals the heart was normal whereas in 3.0 per cent there was functional disease and in 0.5 per cent organic disorder was present.

Examination of the lungs indicated that in 1.0 per cent individuals there was abnormality and these could be divided into three groups as follows:—

Abnormalities of lung	Frequency
	per cent
Congestion ..	0.4
Catarrh ..	0.3
Chronic disease ..	0.3

Examination of other organs revealed the following percentages of defects :—

Organs	Percentages found defective	Organs	Percentages found defective
Eye ..	19.9	Subcutaneous tissue.	13.0
Nose ..	19.3		
Mouth ..	25.9	Bones ..	0.5
Teeth ..	35.1	Lungs ..	1.0
Throat ..	18.6	Circulatory system.	35.1
Ear ..	2.2		
Hair ..	4.8	Abdomen ..	7.7
Skin ..	28.6	General ..	7.5

The organs in which the defects are commonest are teeth, circulatory system, skin and mouth. Defects in eye, throat and nose though less common are quite considerable.

The hæmoglobin percentage of the community as determined by Tallqvist method is below standard and almost all the circulatory defects are perhaps due to the anæmic state of the population.

Hæmoglobin percentage	Males	Females
	per cent	per cent
–50	2.2	2.6
–75	73.6	84.0
–100	24.2	13.4

The women are more anæmic than men. The cause of such widespread anæmia is not very clear especially in view of the fact that only 2.4 per cent of persons exhibited an enlarged spleen, while out of 897 persons examined for the presence of malarial parasite in the blood 0.1 per cent proved positive.

During the survey there were 28 pregnant women in the community. The table below gives the number of pregnant women according to parity:—

Parity	Number	Parity	Number
1	4	6	2
2	5	7	2
3	5	8	..
4	4	9	1
5	4	10	1

Of the above 71.4 per cent were healthy, 7.1 per cent complained of pain, another 7.1 per cent complained of headache and the rest had minor complaints. In only 20 cases inclusive of the 4 primiparæ could the risk to the mother and child be ascertained. Of these in 3 cases of multipara the risk to the mother was moderate while in one case each of the multipara was there 'moderate' and 'grave' risk to the infant. None of the pregnant women attended the clinic attached to the Health Unit at Singur. In nearly 60 per cent of the cases the women had not been visited by health visitors.

Early marriage amongst girls is common, though not the rule, as 39 per cent girls between 12 and 15 years are reported as unmarried. Since the median age at marriage of all the women in the village is about 11 years there is an indication that the age at marriage for girls is on the increase. There is usually a time lag between the age at marriage and age at cohabitation with the result that out of 269 married and widowed women in the village only 15 have had their first pregnancies before 14 years of age.

Due to lack of standards it is not possible to comment on the state of development of the infants. All the infants between 5 and 6 months were over 10 pounds in weight and one infant 9 months old was more than 20 pounds. The average heights at different months is given in the following table:—

Age in months	Average height in inches	Age in months	Average height in inches
0–	18.2	5–	22.5
1–	18.5	6–	20.8
2–	21.3	8–	25.3
3–	22.5	10–	26.3
4–	24.1		

Regarding dentition it may be mentioned that no infant below 8 months had any teeth erupted and of the infants above 8 months, 6 had not developed any tooth at all while the others had on an average 5 teeth. None of the infants had been weaned though some of them received solids even after the fifth month. Fresh milk and cereals are regularly supplemented to mother's milk after the sixth month. It is the exception rather than the rule for infants to get fruit juice and none is given egg, fish or meat.

The average weight of pre-schools between 1 and 2 years of age is 20.3 pounds for males

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and 18.7 for females. The same for the age-group 2-5 years is 26.5 pounds for males and 24.0 for females. The heights in inches in the different age groups are:—

Age groups	Males	Females	Age groups	Males	Females
1–2	29.0	27.2	2–5	34.8	33.3

Of the 21 pre-schools aged between 2 years 6 months and 2 years 9 months, 18 had cut 20 teeth. All the pre-schools above 2 years and 9 months had 20 teeth. It is surprising that 12.5 per cent children between 4 and 5 years and about 50.0 per cent children between 2 and 4 years have not been weaned. The strain on maternal health due to delayed weaning though considerable is not fully appreciated by the villagers.

The average weight and height for age groups greater than 5 years are given below separately for males and females :—

Age groups	Weight in pounds		Height in inches	
	Males	Females	Males	Females
5–10 ..	38.1	38.9	42.4	43.6
10–12 ..	57.4	60.0	50.8	52.0
12–15 ..	66.2	66.7	54.3	54.2
15–20 ..	84.8	82.4	61.3	57.0
20–40 ..	102.8	90.4	62.6	57.7
40–60 ..	109.0	87.2	63.6	57.9
60 and over	90.9	84.6	62.7	57.0

The weights and heights had they been recorded for individual ages between 5 and 10 years would have provided a sensitive index to judge growth. Yet the table above shows clearly that the average weight is below par.

Nutritional state

Rice is the staple food of the population. Though each family has a cow, the bulk of the milk obtained is sold to supplement the family income. The food of the villagers is very deficient in animal proteins. Vegetables are usually grown in the courtyards and used by the family. The villagers eat fish, though not regularly.

The general under-development of the community directs attention to the nutrition question. A diary method of nutritional survey of 100 families for four days gave the following figures *per capita* consumption: the standards used for comparison are based on the recommendations of the Food Committee, British Medical Association and the Technical Commission of the League of Nations :—

Essential food component	*Per capita* consumption per day	*Per capita* requirement per day	Adequate or not, if not by how much ?
Animal protein	6.9 gm.	50.0 gm.	43.1 gm.
Vegetable protein ..	58.1 gm.	50.0 gm.	Adequate
Fat	31.6 gm.	Animal fat 50.0 gm. Vegetable fat 50.0 gm.	68.4 gm.
Carbohydrate	598.3 gm.	425.0 gm.	Adequate
Calories	3,088.0 cal.	3,000.0 cal.	Adequate
Calcium	0.45 gm.	0.75 gm.	0.30 gm.
Phosphorus	1.96 gm.	1.00 gm.	Adequate
Iron	31.33 mgm.	10.00 mgm.	Adequate
Vitamin A	924.00 µg.	1,000.00 µg.	76.00 µg.
Vitamin B	2,390.00 µg.	900.00 µg.	Adequate
Vitamin C	157.00 mgm.	50.00 mgm.	Adequate

The diet is deficient with regard to animal protein, fat, calcium, and to a slight extent in vitamin A. Considering the diet of the pre-school children only 5.3 per cent receive more than 10 ounces of milk per day, 8.3 per cent get fruit twice a week, 3.8 per cent get eggs twice a week and 1.5 per cent get meat twice a week. 74.3 per cent get cereals daily. No wonder that with such deficiencies in the important food elements intimately connected with growth, the community should be below par in physique.

Epidemiological factors

Under-nourishment may affect community health by lowering resistance to infection. Yet it is felt that even in the absence of facilities for immediate improvement of the economic condition and thus the nutrition status of the community, such communicable diseases as smallpox, typhoid and cholera can however be checked by control measures only. So a study of the epidemiological factors of the community with respect to such diseases merits attention.

The community being mostly agricultural, there is hardly any movement of the population from in and out of the village. An occasional visit to relatives may take the villager away just for a few days. Aggregation and dispersal of any magnitude takes place only on two days in a week when the villagers visit the *bazar* in Singur. Occasionally big *Jatras* are arranged locally which are attended by large groups of people from neighbouring villages. The population thus being practically closed, it should not

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be so difficult to keep away communicable diseases.

As already stated intestinal diseases are the commonest cause of morbidity. The unclean habits of the community in the indiscriminate pollution of the surroundings, the absence of tube-wells within easy reach offering an inducement for the use of *doba* water for cooking, etc., no doubt are the major factors responsible for this. The fairly loose and always moist soil, the high temperature and humidity and the shade given by rank vegetation favour the development of the hookworm larvæ, which infest and undermine the general health of the community.

During the year under review, there have been cases of easily controllable communicable diseases as smallpox, cholera, and typhoid. This is undoubtedly a reflection on the state of artificial immunization against these diseases. No attempt at immunization against typhoid and cholera appears to have been made before the outbreak of these diseases. Even then the population protected is very small, being only 0.4 per cent for typhoid, the figure being still poorer for cholera. With regard to smallpox immunization figures are high as an intensive campaign for vaccination has been undertaken recently after the occurrence of two cases of smallpox. 95.2 per cent of the population have been vaccinated at least once, the percentage for males and for females being 94.6 per cent and 95.9 per cent respectively. Re-vaccination is less common, 40.1 per cent males and 29.6 per cent females being re-vaccinated. Vaccination amongst infants is fairly high; 17.9 per cent of infants under six months and 75.0 per cent infants over six months bearing marks of successful vaccination. In the age-groups 1-2 years and 2-5 years the percentages of vaccinated are 92.5 and 94.6. The table below gives the vaccination and re-vaccination results for different age groups by sexes :—

Age in years	Percentage vaccinated		Percentage re-vaccinated	
	Males	Females	Males	Females
0–	44.4	38.1	7.4	4.8
1–	91.3	94.1	17.4	0.0
2–	90.6	100.0	15.1	15.4
5–	100.0	96.8	38.1	33.3
10–	97.3	100.0	46.0	42.9
12–	97.0	100.0	54.5	26.1
15–	95.8	95.7	58.3	28.3
20–	100.0	99.3	49.0	34.7
40–	94.9	100.0	41.6	35.8
60–	100.0	97.0	48.3	24.2

Malaria surveys

Before 1911 this area was free from malaria. Afterwards the disease spread into this area from the Burdwan side and the 1926 malaria survey revealed a fairly high spleen rate of 14.5. The following figures of spleen rate for a few years show how fluctuating the values can be for different years :—

Year	Spleen rate	Year	Spleen rate
1930	16.6	1941	28.3
1940	33.3	1942	8.3

Past experience shows that the disease manifests itself in epidemic form once in about six years, one of the determining factors being heavy rainfall in the preceding year.

Results of survey.—Ninety-eight breeding places consisting of 4 tanks, 89 *dobas*, 1 pit and 4 irrigation channels were examined for larvæ. In all the 4 tanks, 3 channels and 36 *dobas*, larvæ were found; the species found being *A. vagus, A. hyrcanus, A. barbirostris, A. annularis, A. culicifacies*. The local carrier species, *A. philippinensis*, were not found in any of these breading places.

Ninety-five places consisting of 53 cow-sheds and 42 houses were examined for the presence of adult anophelines. The species found and the number of each species caught are given below:—

Species	Number found	Species	Number found
A. annularis ..	205	*A. pallidus* ..	7
A. hyrcanus ..	14		
A. vagus ..	9	*A. barbirostris*	1

No adults of the local carrier species were found. Of the 302 children between 2 and 12 years examined, only 6 showed enlarged spleen, the average enlarged spleen being 8.8.

Judging from past history it is doubtful if the present malaria status will continue for long and to study the importance of the malaria problem at least one more survey during the malaria season is called for.

Socio-economic factors

Intimately connected with any effort at Public Health Organization is the question of finance and the extent to which a community can bear the expenditure on public health. Intermingled with the economic question and oftentimes acting as a drag on progress by its conservatism are the habits and mode of living of the community. As these factors have also to be taken into consideration in appreciating the epidemiological picture of a community, a brief discussion of the socio-economic factors at Ratanpur will now be made.

Except for a few cottage industries like net making for fishing and other purposes, agriculture is the mainstay of the population, the chief crop grown being paddy. Vegetable gardening is popular and helps to supplement the income from agriculture.

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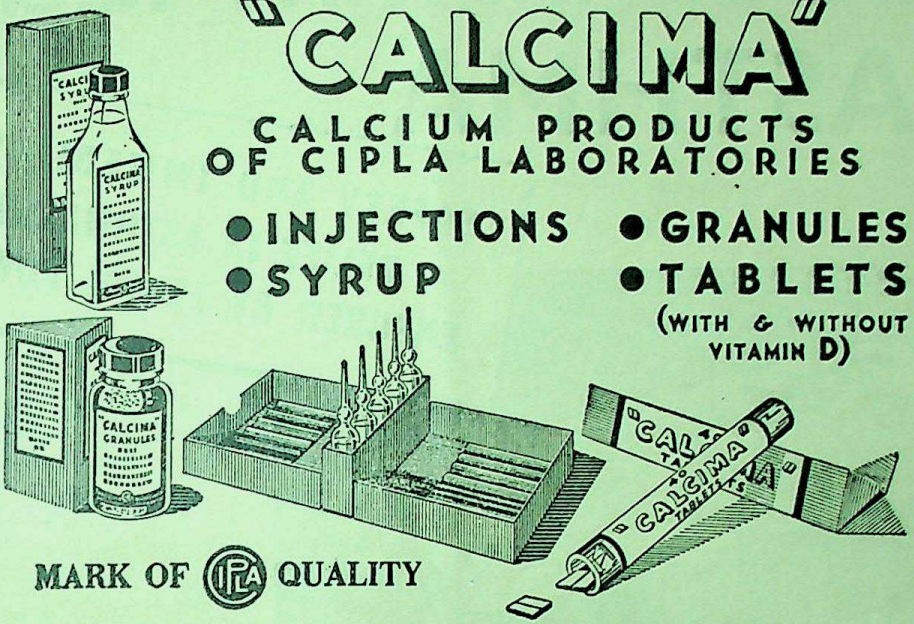

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The villagers lead a hand to mouth existence and being mainly agricultural and so entirely dependent on the vagaries of nature for their very existence often run into debt. It was difficult to obtain from the villagers information on family earnings though they were very co-operative in supplying detailed monthly expenditure under various heads. As such it is difficult to assess exactly as to what proportion of families were able to run the household without running into debt.

The *per capita* monthly expenditure is Rs. 8.4 and this meagre amount can hardly provide anything more than the bare necessaries of life like food and clothing.

Table below gives the percentage spent on the different items by families classified acording to their monthly expenditure:—

Family expenditure in rupees (monthly)	Average monthly expenditure *per capita* (in rupees)	Food	Light and fuel	House rent and house tax	Clothing, bedding and foot-wear	Toilets	Furniture	Education	Medical advice and medicines	Travelling	Ceremonies	Debt discharge	Others
–20	6.7	78.8	5.2	1.2	7.0	0.9	0.0	0.4	1.6	0.8	0.8	3.2	0.1
–30	6.7	78.6	5.1	1.3	6.4	0.9	0.0	0.6	3.4	1.0	0.4	2.2	0.1
–40	8.9	79.1	4.8	1.1	6.7	0.7	0.0	0.3	2.5	1.5	0.5	2.7	0.1
–50	8.0	78.0	4.8	1.6	7.8	0.8	0.0	0.5	2.1	0.7	1.0	2.3	0.4
–75	8.0	79.1	4.3	1.5	7.1	0.5	0.1	0.6	1.6	1.4	1.5	1.8	0.5
–100	10.2	77.7	4.1	1.0	7.9	0.8	0.0	0.7	1.1	0.9	1.4	4.4	0.0
–150	9.2	75.0	5.2	3.0	6.8	0.8	0.4	0.4	3.0	1.0	1.6	2.2	0.6
–200	12.0	75.0	3.5	1.0	10.5	1.0	0.0	1.0	2.0	1.0	1.0	4.0	0.0
200+	12.4	81.0	1.0	1.0	10.0	3.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0

The bulk of the expenditure is spent on food, clothing and house rent and house tax. On an average an individual spends about Re. -|3|- per month for private medical help.

Education

There is a lower primary school in the village with 90 students on its roll but the benefit derived from it is questionable. The condition of the school is deplorable, the thatched roof having nearly given way. This school has to be run from the grant given by the District Board and the fees from the students except for small donations, but it appears that the grant from the District Board has been very irregular for the last one year. The apathy of the paid teachers caused by such treatment is reflected in the efficiency of the school.

The percentage of literacy amongst males over 15 years of age is 52.5 and amongst females of the same age group it is 3.1, literacy being defined as the ability to read and write a letter.

Agriculture and animal husbandry

The population is mainly agricultural and as in other parts of India the methods used are those handed down for generations. There is no central organization to supply the villagers with selected strains of paddy for cultivation or to educate them in such agricultural principles as the rotation of crops, etc.

Animal husbandry is non-existent. Any public agency which would help to introduce animal husbandry and pisciculture in the villages and thus improve the economic condition and the dietary of the population would be doing a very great service.

Communal activities : public health administration

Apart from the usual facilities of the Bengal Government, the village has the advantage of coming within the sphere of activity of the Singur Model Health Unit which is financed by the Government of Bengal and the International Health Division of the Rockefeller Foundation. The *per capita* expenditure of the health unit is about Re. -|11|- per year and its activities include—(1) environmental sanitation, (2) public health education, (3) collection and checking of vital statistics, (4) maternity and child welfare services (domiciliary and clinical), (5) school medical inspection, (6) control of communicable diseases and (7) training of public health personnel.

Considering that only 2 out of 52 births during the past year were conducted by the midwives of the health unit, the benefit that the villagers derive from this organization is questionable. The ante-natal cases in the village are also not often contacted by the health visitors. This is mostly because the villagers have all along been strangers to trained service though they are slowly overcoming their shyness.

There is no medical unit in the village. The nearest hospital is at Singur where there is an indoor hospital with 14 beds, with separate accommodation for males and females. This curative organization and the health unit meant for preventive purposes are managed by two different bodies. Only by co-operation between these two organizations can the public health problem of the area be solved efficiently.

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Very few social agencies are present in the village. The existence of a primary school though not in good condition has already been referred to. There are no co-operative societies or other social welfare organizations. Even recreational facilities are limited only to the religious side of life, there being one *Bhajan Mandir* in Ratanpur.

Recommendations to improve the welfare of the villagers

(1) Environmental sanitation should be improved. Not only are tube-wells needed but an agency to maintain them in good condition is a greater necessity. The expenditure for sinking and maintenance could be considerably reduced if the village labour is utilized. Only supervision would be needed and the sanitary inspectors of the Bengal Health Department could be trained for this purpose. Periodical bacteriological examination of water supply is also desirable. Provision of suitable latrines is an urgent necessity. For the latter object village labour should be utilized.

(2) Effective control of communicable diseases by disinfection, immunization and better facilities for notification and isolation of cases, should be attempted.

(3) All the persons infected with hookworm should be treated and restored to normal health.

(4) The villagers should be made more conscious of public health by propaganda and the measure of success obtained should be judged by the extent to which they enjoy the facilities of the Rural Health Unit at Singur, especially for maternity and child welfare services.

(5) The economic condition and the dietary of the people should be improved at least by the introduction of pisciculture, if not of animal husbandry. It is fully realized that in their present economic position they cannot afford to embark on this scheme by themselves. Monetary assistance in the beginning of every year for at least a couple of years would be needed and the advance should be made by co-operative banks on condition that the money advanced with a nominal interest should be returned at the end of the season. One can safely assert that if the villagers find the occupation profitable there will be no more need for persuasion.

(6) Improved strains of paddy should be introduced and a scheme for the rotation of crops should be recommended. The impetus should come from public bodies.

(7) An efficient system for the collection and checking of vital statistics should be introduced and the villagers made to appreciate the utility of early reporting of the vital events.

(8) No amount of money spent or services done can leave a lasting effect if the villagers are not genuinely interested in public health activities. Their interest can be roused and kept up only by education. So no useful attempt at improving the welfare of the villagers can be made without trying to educate the children of to-day, who shall be the citizens of to-morrow.

Current Topics

To Defeat the Typhus-bearing Louse

(From the *Lancet*, Vol. II, 29th November, 1941, p. 688)

THE Ministry of Health puts us on our guard against the possible arrival of louse-borne typhus in this country, in company with refugees, prisoners of war and returning travellers. The body-louse and the head-louse are both probable vectors. Diagnosis depends on the sudden onset, high temperature, the appearance on the 4th or 5th day of a rash which spares the face, and a torpid or maniacal mental state. The Weil-Felix reaction can be obtained by the end of the first week and sometimes earlier. A strong reaction in a dilution of 1 in 80 or 1 in 100, obtained by a naked-eye reading, may be taken as positive, and during the later stages of the disease the titre rises to 1 in 1,000 or even higher. At the other end of the scale, any increase in the agglutinating power of the serum, established by examinations at 2-day intervals, is significant even at a titre of 1 in 50. A vaccine against infection is available but its value in the field has not been tried. It is to be used at present only by those working on typhus teams and is to be given in three doses of 1 c.cm. at weekly intervals. If typhus does reach this country it is most liable to break out in crowded areas. Several of the large cities have been asked to organize typhus teams, each of which is to include the medical officer, 4 nurses, 1 ambulance driver, 1 ambulance attendant and 1 or more sanitary inspectors and trained disinfectors. The team should be duplicated so that absentees can be replaced.

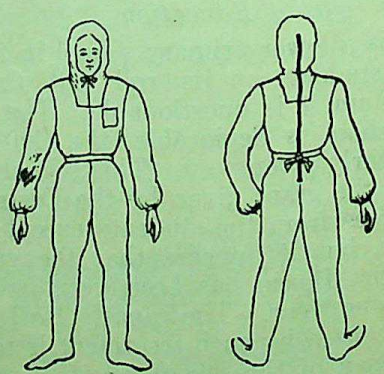

Figure shows one-piece suit for use by hospital and ambulance personnel. It is closed by means of a Zipper behind, elastic round the wrists, and a tape round the face, tied under the chin.

All team members are to be provided with protective clothing consisting of a one-piece garment with a hood fastening down the back, preferably with a Zipper. A tape runs round the face aperture of the hood and ties under the chin, and tapes and elastic draw the

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sleeves closely round the wrists. Gum-boots and long fabric gloves are also to be worn, and masks if desired. Protective clothing is absolutely necessary for members of the team, since any of them may come into contact with typhus-infected lice. During removal to hospital the patient should be enveloped in a large sheet, and should travel in a vehicle which is easy to free from lice. The staff engaged in admitting the patient to hospital are particularly exposed to danger, and the greatest care of all should be taken during this time. The patient must be admitted to a special bathroom, stripped, deloused and clad in hospital clothing before being taken to a ward set aside for the purpose. Delousing must include not only complete disinfestation of the patient's clothing but careful delousing of his person, close cutting of the hair, shaving where necessary and careful bathing. He must be thoroughly soaped all over and cleansed in such a way that all lice are destroyed. In the hospital a room must be provided where the staff can change into protective clothing. After use the clothing must be left there for disinfection; the staff must pass next to a bathroom and finally to the room where their ordinary clothing is kept.

Officers with experience of typhus in the medical department of the Ministry of Health or in the L.C.C. will help to advise on diagnosis, and arrangements have been made for a mobile team from the American Red Cross—Harvard Field Hospital Unit—to give help in diagnosis and control in any part of England or Wales. Medical officers of health are advised to arrange for beds to be available in the larger isolation hospitals. The origin of infection must be carefully traced and all those who have been exposed to risk must be deloused and kept under observation for three weeks. Heavily infested people may have to be deloused a second time after an interval of ten days to ensure destruction of lice hatched from surviving eggs.

Scabies "the Itch"

(Summarized from a paper by P. A. BUXTON in the *British Medical Journal*, Vol. II, 20th September, 1941, p. 397)

THIS is a contagious disease caused by the presence on the skin of the itch mite *Sarcoptes scabiei* de Geer.

Ætiology.—All ages are susceptible to this disease and both sexes are equally affected. In peace time children are the worst sufferers. They get the infection from other children at school and then spread the disease to their families. Next to the children, people attending to the animals—horses, sheep, pigs and dogs—get the infection from the animals, and spread the disease through their families. The disease spreads rapidly in places where there is overcrowding. Amongst labourers and troops the disease is brought from families and spread amongst the fellow workers and troops.

Sarcoptes scabiei: Appearance.—The female mite is about 0.390 mm. long and the male 0.225 mm. The general outline of the itch mite is oval: it is convex above and flat below and of dirty white colour. The adults and nymphs have four pairs of legs and the larvæ three pairs. The anus is terminal. The legs are short; in the female the first and second legs terminate in suckers (ambulacra), in the male there are similar suckers on the first, second and fourth legs. The male has large and elaborate genital organs lying on the ventral surface between the fourth pair of legs. Anatomically the mites attacking man, horse and the common pets are not to be distinguished.

Life cycle of the Sarcoptes scabiei.—Much of the life cycle is passed beneath the surface of the skin of the host. The adult female usually lives in the burrows made by the nymph, but removed from her burrow she is capable of burying herself again completely in a very brief period. Usually the burrows are made in the parts of the body where the skin is thin, for example the webs between the fingers, the flexor surfaces of the wrists, etc. Once beneath the skin the mite rests if the body is cold and continues to excavate its burrow only if the skin is warm. It is when the mite is wandering on the skin that the itching is felt so it is worse in the night when the patient's body is warm under the cover of the blankets. Within 24 hours of maturing the female lays the first egg.

The duration of the successive stages from the hatching of the egg to the emergence of an adult female is as follows:—

Eggs—2½ days or more; larva—1½ to 3 days; nymph—1½ to 2½ days; immature female—2 to 4 days. The shortest period from the deposition of eggs to the emergence of adults may be just short of eight days. The larva quits the burrow of its parent in which it hatched from the egg and makes its own burrow. The nymph in its turn makes its own burrow. It is not known whether the males and the immature females make their own burrows or continue in that made by the nymph. The adult female does not normally move though she can start a fresh burrow if she is forcibly removed from her burrow.

The itch mite cannot survive long outside the skin burrow of the host and it seems probable that she lays rather more than two eggs daily to a total of about forty to fifty.

Hosts.—Mites similar to that of *S. scabiei* of man causing itching and mange occur on the horse, dog, sheep, rabbit and other animals. Anatomically these mites are not separable from one another and it is customary to speak of varieties such as *S. scabiei* var. *hominis* on man, var. *equi, canis, suis, ovis,* on the horse, dog, pig and sheep and so on.

Transmission.—There is no doubt that one human being is normally infected from another, the itch generally spreads through a family or a group of man living together. Scabies infection has also been traced to domestic animals such as horses, dogs, cats and rabbits. Its spread through the fomites has not been proved definitely, but for all practical purposes the fomites are recognized as a source of infection and should be treated as such.

The severity of the scabies acquired by man from animals differs greatly with circumstances. Mites derived from camels appear to be particularly irritating. Some of the cases of crusted scabies in man may be derived from animals.

Medical importance.—It is very important to detect scabies, segregate the patients and treat them effectively in order to stop further spread of the disease. In conditions of war its spread among labourers and troops should be prevented because it causes loss of time and impairment of efficiency in the men due to lack of sleep owing to the intense irritation at night. Its spread amongst school children is very rapid and causes a good deal of suffering.

Symptoms.—The cardinal symptom is the intense itching especially at night. The mites wander about in the night to make fresh burrows when the body surface is warm, that is when the patients cover themselves with blankets. In the tropics patients complain of itching both in the day and night but the irritation is always worse at night. The scabietic child looks pale, heavy-eyed and is irritable. Left untreated for some time the lesions become infected with secondary pyogenic organisms such as strepto- and staphylococci and an inflammatory condition supervenes. The hands, feet and buttocks become covered with painful pustules and there is often inflammation and fever. Nephritis is a frequent sequela due to a large skin surface being infected with streptococci.

Crusted scabies or Norwegian crusted scabies.—This is a distinct clinical condition with thick crusts and callosities on the various parts of the body, especially the limbs. The crusts which are stratified may project 2 to 3 mm. above the surface of the skin and consist of dead epithelium, dried exudate and enormous numbers of sarcoptes of all stages. Generally the condition requires at least a year for its development and when fully established gives the appearance of sarcoptic mange such as one sees in the dogs. The hands are more affected than other parts. The condition is very

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rare. It is more common in lepers. Diverse views are held as to the cause of this condition. Many authors regard the disease as normal scabies which has been neglected perhaps because it occurs in insensitive lepers or in careless patients. The alternative view is that the mites in crusted scabies are derived from animals. From the reports on the mites from a crusted scabies in a Chinese leper it was clear that these mites differed in several important characters from the ordinary human variety. It may be that both the above views are correct.

Treatment.—A. The traditional treatment for scabies is the unguentum sulphuris B.P. 1 dr. to 1 oz. Its effectiveness is indisputable and it is very well suited for treatment in the outpatient department where large numbers of patients have to be dealt with economically and because of the simplicity of the method of application.

The patient is given a good wash with soap and warm water—the skin surface is scrubbed well with a hard brush or a rough flannel; the wash is given preferably towards evening. He is then given a quantity of the ointment sufficient to cover his whole day (about 3 ounces of ointment is required for one application for every adult); this he rubs in vigorously for twenty minutes to half an hour and then puts his clothes on and goes to bed.

This process is repeated for three consecutive nights and on the morning of the 5th day he gets a good bath and wears fresh clothes and the treatment is complete. His clothes and bed-sheets that he was using during the four days of treatment should be thoroughly sterilized by boiling.

This method of treatment though simple and efficient is not without some disadvantages, such as (1) The use of an ointment spread thickly over the body means that underclothing and bedding become soiled by the grease. (2) Greasy ointment combined with its pungent smell is objectionable to many people. (3) All the burrows must be opened by preliminary scrubbing otherwise the ointment cannot penetrate. (4) There is likelihood of sulphur dermatitis.

B. Sulphur soap method.

The application of sulphur incorporated in a soap has been used in America fairly extensively in recent times with good results. It is a cleaner method than the messy ointment and the actual quantity of sulphur used for each case being less than that in the ointment. It gives less chance of sulphur dermatitis and it helps the saving of sulphur.

The technique is as follows:—Sulphur in the strength of 18 per cent is mixed with a bland soap (in America soft soap is being used) and made up into tablets of 4 grammes each—which is the amount of soap required to cover the body with lather. (1) The patient is given a good hot bath and scrubbed well with a nail brush or harsh flannel. (2) Then the body is lathered all over with the soap, the foam being produced by rubbing the tablets between the nurses' wet hands. (3) The lather is allowed to dry. (4) Clean clothes put on. (5) This procedure is repeated on two successive days. (6) The clothes and bed-sheets are boiled. (7) If any irritation or excoriations are present unguentum zinci, B.P. or calamine lotion is given to apply for the next few days.

This method though quite effective and clean requires an intelligent person to carry out the instructions, which is not possible in a large outpatient clinic.

C. Benzyl benzoate emulsion.

This method of treatment is very well suited for mass treatment as in the army. The technique is as follows:—Each patient receives a hot bath and the body is well lathered with soap and scrubbed. When the skin is dry the whole body surface from the neck to the toes is covered with an emulsion containing equal parts of benzyl benzoate, soft soap and methylated or rectified spirit (Proscabin-Bayer) applied with a brush. Parts badly affected receive a second painting immediately after the first has dried. The previously worn clothing is then put on. Bath and painting is given on the second day and clean underwear used. The patient is advised to have the clothes and bed-sheets changed and disinfected. The crusted or pustular areas of secondary infection are treated with 1 per cent ammoniated mercury ointment after completion of the benzyl benzoate treatment. Each patient is examined after 4 days or 1 week and if necessary a second course of treatment is given, as above. This treatment requires the help of another man or a nurse and hence only suitable for inpatients in the hospital and for the army.

L. M. GHOSH.

Reviews

EXERCISES IN ELECTROCARDIOGRAPHIC INTERPRETATION.—By Louis N. Katz, A.B., M.D. 1941. Henry Kimpton, London. Pp. 222. Illustrated with 128 engravings containing 189 electrocardiograms. Price, 25s.

IN this book the author has presented an outline of the manner in which to study and interpret an unknown electrocardiogram, and this has been followed by a series of 90 case records. The description and interpretation of each appears on the page opposite to the electrocardiogram and a brief clinical history and series of electrocardiograms taken at different intervals when necessary, are set forth, so that the reader may compare his own interpretation with the author's and correlate the clinical aspects of the cases with electrocardiographic patterns.

The interpretations are based on the teaching in the author's book on electrocardiography. The tracings are well chosen and represent a wide variety of cardiovascular disorders.

The book will be found very useful by the student of cardiology in that it will provide a guided practice in reading and interpreting electrocardiographic records.

P. C. S. G.

ELECTROCARDIOGRAPHY INCLUDING AN ATLAS OF ELECTROCARDIOGRAMS.—By Louis N. Katz, A.B., M.D. 1941. Henry Kimpton, London. Pp. 580. Illustrated with 402 engravings, including 806 electrocardiograms. Price, 45s.

IT is almost a century since it was first observed that twitches of the rheoscopic frog-muscle preparation accompanied the contractions of the heart. Since then, there has been a gradual evolution in the methods of recording and interpreting these cardiac action currents, until the electrocardiogram came into clinical prominence. More recently, a new era has begun with the introduction and development of the clinical use of chest leads, and in the diagnosis and management of coronary disease.

Here is a comprehensive treatise on electrocardiography with an admirable presentation of the subject, emphasizing all its practical aspects along with enough theoretical background to facilitate an intelligent interpretation.

The book is divided into three sections. The first section deals with the theory of electrocardiography with brief accounts of galvanometers, available types of electrocardiographic machines, equipment and technique. In discussing the chest leads the author has presented the recommendations of the joint committee of the American Heart Association and the Cardiac Society of Great Britain and Ireland. Ordinarily, he prefers to take two chest leads CF_2 and CF_4, labelled '4' and '5' in the records for information not ordinarily demonstrable in limb leads. In discussing the place of electrocardiogram in clinical practice, the author says 'the electrocardiograph is not a tool for the unscrupulous or a plaything for the erudite, nor is it an instrument of precision which replaces the ordinary clinical examination. . . . It is as much of an

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error to expect too much from this tool as to ignore the valuable information that it can give'.

The second section describes the normal electrocardiogram and the range of its variations. The normal U wave is considered in the present state of knowledge to be of unknown clinical significance. Table I is a very useful one depicting the characteristics of the normal electrocardiograms. This is followed by discussions on abnormal electrocardiograms which include the changes that occur during administration of drugs and in various diseases, acute or chronic. The changes due to coronary disease have been dealt with in detail.

Section three is devoted to systematic description of the electrocardiogram in the arrhythmias.

Each section is followed by an extensive bibliography. There are numerous excellent, well-chosen and explicit illustrations which, along with the legends beneath each, serve almost as an atlas on the subject. The book is of a high standard and the cardiologist will find it an invaluable aid in his practice.

R. C.

SURGERY OF THE HEART.—By E. S. J. King, M.D., M.S., D.Sc. (Melb.), F.R.C.S. (Eng.), F.R.A.C.S., Major, R.A.M.C. 1941. Edward Arnold and Company, London. Pp. xii plus 728. With 268 Illustrations. Price, 50s.

THIS is a book of rare merit and is a timely publication. It may be included in the surgery of modern warfare.

The text is divided into two main sections, of which the first deals with the anatomy, histology and physiology of the heart with a brief review of electrocardiographic and radiological methods of investigation. The other section, dealing with the treatment of cardiac diseases, is divided into three parts: (*i*) general methods and principles of surgical approach, (*ii*) experimental work, and (*iii*) diseases and their treatment.

This monograph is based on the Jacksonian essay of the Royal College of Surgeons for the year 1938. Surgery of the heart is a very difficult subject but the author has succeeded in compiling a great work, which is assured of a ready welcome. No one will dispute the statement that the surgeon who would attempt the treatment of diseases of the heart must have the courage and optimism of the explorer and be equipped to justify their exploitation. The printing, get-up and illustrations are all excellent. The book is provided with a large bibliography and an adequate index, which will be greatly appreciated.

P. N. R.

THE PROBLEM OF TUMOURS—AN EXPERIMENTAL INVESTIGATION.—By J. C. Mottram, M.B. (Lond.). 1942. H. K. Lewis and Company, Limited, London. Pp. vii plus 91 with 9 tables and 33 Illustrations. Price, 7s. 6d. (Paper boards).

PERHAPS no branch of scientific medicine is more perplexing and fascinating than the problem of tumours. At the same time the subject is extremely important because the number of fatalities and invalidism is enormous. Up to the present day the explanation for causation of tumour formation is a mystery; from time to time various theories were advanced but they all remained in the domain of conjectures.

In this small volume Dr. Mottram has put forth the observations as seen in the course of experimental investigations of tumour formation. He has observed the phenomenon of photo-dynamic activity of benzypyrene on paramecium and its power of increased cellular proliferation. This has opened a new field of investigation, *viz*, the factors that can cause increased cellular multiplication. The physico-chemical processes as described by the author are highly interesting and perhaps continued researches on this line might throw some light on the explanation of tumour formation. It is gradually becoming evident that the medical biologists will have to look forward to the chemists and physicists for the solution of their problems. The experiments of Dr. Mottram will be keenly watched by the scientific world with great expectations.

B. P. T.

Abstracts from Reports

ANNUAL REPORT FOR 1941 OF THE BENGAL BRANCH OF THE BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION

WORK DONE

THE chief lines of work followed during the present year have been as follows :—

Leprosy survey.—In the past leprosy survey work has been of the nature of sample surveys and covering large areas in a limited time.

During recent months, attempts have been made to organize survey work of a more thorough nature in limited areas in such a way as to give accurate information. Such surveys have been carried out during the present year in the following districts: Tippera, Hooghly, Bankura, Malda, Rangpur and Birbhum. Work is now being done in Rajshahi.

Training of doctors.—Under the auspices of the Bengal Branch a special post-graduate course in leprosy lasting for eleven days and attended by 18 doctors deputed by the district authorities in Bengal was held in the Leprosy Department of the School of Tropical Medicine, Calcutta, under Dr. Lowe. Three short courses have been held by Dr. B. N. Ghosh, the leprosy officer, during this year, one in Midnapore and two in Rangpur. These three courses have been attended by 47 doctors. Other similar work has been planned in Rajshahi in December. Three days' instruction was also given for clinic assistants in one district.

Visits to clinics.—There are about 139 leprosy clinics in the districts of Bengal and visits from our staff help to maintain a reasonable standard of work in these clinics.

Detection of cases of leprosy in school children.—During the year, 10 teachers' training schools with 864 students and 41 other schools with 9,102 students have been visited, and the staff and students of these schools have been examined. During this work 44 cases of leprosy have been detected giving an incidence of approximately 0.44 per cent. Lectures on leprosy have been delivered in 23 of the schools visited.

Examination of the police.—At the request of the district authorities in two districts our staff examined the police force of these districts, the total number being 1,598. Among these, 39 cases of leprosy had been detected giving an incidence of 2.4 per cent. Practically all the cases detected, however, have been of very mild type which does not progress, is not infectious and causes no serious disability.

Leprosy in jails.—At the request of one district authority the jail prisoners were examined numbering 906. Among these 19 cases of leprosy were detected giving an incidence of 2.2 per cent, most of the cases being mild.

Propaganda work.—A complete new set of slides for popular lectures has been prepared and a lecture drafted to go with them. New models illustrating the main points about leprosy from the public health standpoint have been devised. New pamphlets on leprosy for use among general public and in schools have been prepared and are being produced in English, Hindi and Bengali. The work included lectures on leprosy, health exhibitions and a radio talk.

Arrangements have been made with the Director of Public Instruction and the Director of Public Health,

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Bengal, for the development of leprosy propaganda in high schools throughout the province. The work done this year in schools has already been mentioned.

Study of leprosy in Calcutta.—It has been felt desirable to obtain more information about leprosy and the spread of leprosy in the general population of Calcutta. One of the assistant leprosy officers has therefore been deputed to study this problem. The findings of this work so far indicate that while leper beggars in Calcutta and neighbourhood may number 1,000, the number of cases in the general population is probably at least ten times this figure, that a considerable number of the cases are infectious, and that a considerable number of persons have acquired the disease in Calcutta.

Study of leprosy in women and children.—For the detection of cases in females—a woman assistant leprosy officer has been appointed under the Branch.

District branches

The following local organizations in Bengal are affiliated to the provincial branch :—(1) Bankura district leprosy council, (2) 24-Parganas district branch, (3) Silda Peddie leper clinics (Belpahari, Midnapore district), and (4) Murshidabad district branch. There are other anti-leprosy organizations in Bengal and their affiliation to this Branch is being encouraged.

Finance

The audited accounts of receipts and payments for the year 1941 show that payments have exceeded receipts by about Rs. 2,300 and that the balance has been reduced from Rs. 16,684-12-3 to Rs. 14,382-9-0. Nevertheless the financial position of the branch remains sound; but if the work is to be continued on the present scale, additional income will be needed later.

REPORT OF THE WORKING OF THE PUNJAB MENTAL HOSPITAL, LAHORE, FOR THE YEAR 1941

Total population.—The year 1941 opened with 1,128 patients (902 men and 226 women) and closed with 1,169 (929 men and 240 women). The total number of patients treated in the hospital during the year under report was 1,416 as against 1,366 in 1940 and the daily average strength rose from 1,090.84 in 1940 to 1,143.43. It has been possible to reserve accommodation up to 100 patients for military insanes belonging to this province.

Admissions and discharges.—The number of admissions and re-admissions was 252 (204 men and 48 women) and 36 (29 men and 7 women) respectively as against 289 (236 men and 53 women) and 42 (38 men and 4 women) in the preceding year. The total number of discharges was 195 (165 men and 30 women), *viz,* 89 cured, 59 improved, 29 not improved and 18 otherwise as against 117, 27, 42 and 21 respectively in the preceding year. The total number of deaths was 52 in 1941 as against 31 in the previous year. The percentage of deaths on the daily average strength and on admission was 4.54 and 4.51 as against 2.84 and 2.42 respectively in 1940.

Health of patients.—There was no outbreak of an epidemic nature and the general health of patients during the year under report was satisfactory. The chief treatment for mental disorders done in the hospital is with cardiazol, ammonium chloride, and sulphosin. These treatments were carried out with encouraging results. The occupational therapy such as agriculture, gardening, weaving, munj matting, etc., continues to be the main feature of treatment.

Of the total number of 288 admissions 155 were Hindus (122 men and 33 women), 114 Muslims (97 men and 17 women), 1 European, 10 Indian Christians (6 men and 4 women), and 8 others (7 men and 1 woman) as against 166 Hindus, 151 Muslims, 8 Indian Christians and 6 others in 1940.

The principal types of insanity among the patients treated in 1941 and 1940 are compared below :—

	1941	1940
(1) Manic depressive insanity ..	344	349
(2) Schizophrenia including dementia præcox	358	358
(3) Secondary dementia	136	143
(4) Mental deficiency	138	129
(5) Epilepsy and epileptic insanity ..	136	119
(6) Mania	95	67
(7) Paranoia and paranoid states ..	68	63
(8) Cannabis indica psychosis ..	51	50
(9) Melancholia	39	45

General.—The non-official visitors took keen interest in the welfare of the patients, especially Mrs. Bharucha whose name is worthy of special mention in this connection.

Correspondence

LOCAL CHEMOTHERAPY OF WOUNDS

SIR,—For the last six months I have been trying sulphanilamide locally, either in powder form or sometimes in the form of a 3 to 5 per cent ointment with sterile vaseline, mostly in dressing infected wounds with a fair amount of sloughs in them. I had a mind all along to assay properly the merits of topical application of sulphanilamide, *vis-à-vis* the acriflavine ointment dressing, in these cases. Of course, till very recently sulphanilamide in my hand could not prove to be the better substitute, though verily it was never a failure either.

Recently for about a month I have made a little alteration in its mode of use by adding cod-liver oil (pure) to my usual formula of its ointment, whereby now I find its bactericidal effect definitely enhanced in comparison with its previous result.

Lately, apart from suppurating wounds I have tried it with very encouraging results in a good many cases of impetigo contagiosa, pustular eczema, and some obstinate cases of paronychia that baffled practically all other methods of local treatment.

In all my cases treated so far, I have used only 'septanilam' brand of sulphanilamide in the following prescription :—

℞ Septanilam	..	grs. 20
Oil morrhuæ	..	drachms 2
Lanoline ad	..	1 ounce
		Fiat unguentum

J. C. BISWAS, L.M.F.,
Assistant Medical Officer,
South Dum Dum Municipality.

DUM DUM,
18*th April,* 1942.

CHEMOTHERAPY IN BACILLARY DYSENTERY

SIR,—I read with interest Dr. D. Lapping's article on 'Chemotherapy in Bacillary Dysentery', in the last February copy.

I have had the chance of treating eleven cases of bacillary dysentery with Dagenan, with no mortality

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and highly satisfactory results. Some cases were very toxæmic on admission. On the second day of treatment the patients generally felt better and rapid cure followed. The general line of treatment followed here is Dagenan 2 tablets, *t.d.*, for adult and children proportionately; with free alkaline *cum* glucose drink. Bael Sherbet in the early morning was supplied, as this is noted to turn the stools formed early. A dose or two of Dover's powder were needed for the bad cases.

S. C. GUHA ROY, L.M.F.,
Assistant Medical Officer,
Borbheel Tea Co., Ltd.,
Borgang P. O., Assam.

4th April, 1942.

THE ASSESSMENT OF VITAMIN NUTRITION

SIR,—In his article on 'The Assessment of Vitamin Nutrition' published in the *Indian Medical Gazette* of March 1922, Dr. N. C. Datta writes (line 10, p. 157, column 1), 'They found the daily excretion of most of the *normal* individuals whom they examined to lie between 150 *to* 240 *mg.* Westenbrink and Goudsmit (1938) are of opinion that individuals excreting *over* 100 *mg.* of vitamin B_1 are saturated with the vitamin' (italics mine).

I am surprised to read this statement and should be interested to learn the diet that these *normal* people consumed. So far as I know, no dietary in the world supplies such large amounts of vitamin B_1 and even the most liberal standard of the human requirements of this vitamin lies somewhere between 2 to 3 mg. Obviously, what is meant is international units and not milligrams in the above statement. But the error does not appear to be a misprint or a mere slip of pen, for, in column 2 line 20, we read, ' . . . a value of 4.5 *mg. per* 100 *c.cm.* or less for human blood is considered to be *significantly low*' (italics mine).

Even at best, this is a careless statement and I should not have thus protested but for the fact that similar errors had also crept in Sir R. N. Chopra's article which appeared in the February number.

K. A. SHAH, M.B., B.S.

RANCHHODLAL DISPENSARY,
PANCHKUWA, AHMEDABAD,
28*th April,* 1942.

TRICHLORETHYLENE

SIR,—I am made to understand by medical colleague of mine that trichlorethylene is as useful if not more pleasant as tetrachlorethylene or carbon tetrachloride. But no suggestion of such drug is being seen in your editorial of March 1942.

I shall be pleased if you will kindly reply me whether 'trichlorethylene' is advocated in the latest edition of Manson-Bahr.

C. MATHAI.

KADAMANKULAM ESTATE,
MUNDAKAYAM P. O.,
S. INDIA,
18*th April,* 1942.

[*Note.*—Trichlorethylene is used in industry as a fat solvent and numerous cases of intoxication have been reported from workers exposed to the vapours of this compound. Cases of acute poisoning have been reported in men using trichlorethylene to remove grease from machinery.

Animal experiments with this compound have shown that it has very little action against hookworms (Wright, W. W., 1932, *Amer. Journ. Hyg.*, 16, 2, 325).

Probably this letter refers to the editorial of March 1941 in which hookworm infection was discussed, and not to that of March 1942 which was on industrial hygiene. Was our correspondent's mistake an inspired one, because trichlorethylene appears to be more important from an industrial hygiene point of view than from an anthelminthic?

This drug is advocated in the last edition of Manson's Tropical Medicine.—EDITOR, *I. M. G.*]

KNOWLEDGE OF SEX

SIR,—The comments on the sociological importance of sexual knowledge of Indians by Lieut.-Colonel O. Berkeley-Hill, I.M.S. (Retd.), in his article 'A Case of Mild Hypopituitarism' appearing in March 1942 number of the *Indian Medical Gazette* have neither been based on facts nor fairly drawn. It appears obvious that the author has tabooed Indians unjustly.

Although he has not given out what is the importance of sexual knowledge but it is true that procreation is the chief object and that its natural instinct common to mankind, irrespective of colour, creed and climate. It is the primitive quality of mankind, none having monopoly over it, unaffected hitherto by any sort of influence from any quarter.

India's population, according to last several censuses, has shown continuous increase. In spite of anxiety of the author, Indians are not dissatisfied with their ideals of plain living and high thinking. Would it be too much to expect that authors will save the trouble of making needless comments on racial knowledge of sex when they can easily do without those.

K. DUTT,
Honorary Secretary,
24-Parganas Branch,
All-India Medical Licentiates' Association.

9-B, ROYPARA BYE LANE,
COSSIPORE,
CALCUTTA,
24*th April,* 1942.

028482

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL G. H. MAHONY, I.M.S. (retired), is temporarily appointed as Civil Surgeon, Darjeeling, for a period of 1 year, with effect from the 3rd February, 1942.

His Excellency the Governor of Bengal is pleased to appoint Lieutenant-Colonel G. H. Mahony, I.M.S. (retired), Civil Surgeon, Darjeeling, as Honorary Surgeon to His Excellency at Darjeeling, with effect from the 3rd February, 1942.

On reversion to military duty of Lieutenant-Colonel V. R. Mirajkar, O.B.E., Professor of Surgery, and Principal, K. E. Medical College, Lahore, Lieutenant-Colonel S. N. Hayes, Professor of Midwifery, assumed collateral charge of the office of Principal of the College on the afternoon of the 15th April, 1942, and Lieutenant-Colonel A. S. Fry, Professor of Operative Surgery, assumed charge of the office of Professor of Surgery in addition to his own duties on the hour and date mentioned above.

On return from leave Major F. R. W. K. Allen resumed charge of the office of Civil Surgeon, Raipur.

INDIAN LAND FORCES

(Emergency Commissions)

The undermentioned Lieutenants (on probation) are confirmed in their rank, with effect from the dates specified :—

M. Alam. Dated 1st August, 1940.
S. K. Ghosh. Dated 2nd December, 1940.
A. R. Biswas. Dated 25th March, 1941.

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B. K. Sheorey. Dated 23rd June, 1941.

The undermentioned appointments are made :—

To be Lieutenants

James Elliott Moncreiff Melville. Dated 29th November, 1941, with seniority from 29th November, 1940.

Hugh Rosborough Swanzy Harley. Dated 29th November, 1941, with seniority from 29th November, 1940.

Owen Clarke. Dated 20th December, 1941, with seniority from 20th December, 1940.

Duncan MacAulay. Dated 20th December, 1941, with seniority from 20th December, 1940.

Archibald James Sinclair. Dated 20th December, 1941, with seniority from 20th December, 1940.

Kenneth James Langlands Scott. Dated 20th December, 1941, with seniority from 20th December, 1940.

William Francis John Maxwell Thom. Dated 20th December, 1941, with seniority from 20th August, 1940.

George Edwin Spear. Dated 20th December, 1941, with seniority from 20th June, 1940.

Norman John McQueen. Dated 20th December, 1941, with seniority from 20th June, 1939.

Alastair Colon Mackenzie. Dated 20th December, 1941, with seniority from 20th June, 1940.

Danier Crawford Logan. Dated 20th December, 1941, with seniority from 20th June, 1940.

PROMOTIONS

Lieutenant-Colonel P. D. Chopra (now on military duty) has been advanced to the higher position of his rank, with effect from the 14th October, 1941.

Lieutenant-Colonel A. S. Fry, Professor of Operative Surgery, K. E. Medical College, Lahore, has been advanced to the higher position of his rank in the increased pay admissible, with effect from the 22nd November, 1941.

Captain F. V. Stonham has been promoted to the rank of Major, with effect from the 1st February, 1942.

INDIAN LAND FORCES

(*Emergency Commissions*)

Lieutenants to be Captains

M. Alam. Dated 1st August, 1941.

S. K. Ghosh. Dated 2nd December, 1941.

1st March, 1942

S. L. Sawhney.	T. M. Rao.
D. N. Vora.	S. Krishnamurti.
K. Minakshisundaram.	L. C. Waderha.
S. S. Kapur.	F. N. Shroff.
B. N. Trilokekar.	A. P. K. Ramamurti.
P. N. Rao.	M. Z. Y. Hussain.
M. Jegaroyan.	B. P. Sinha.
S. K. Ghosh.	P. G. Rau.

C. T. Shah.

J. N. Ghosh. Dated 2nd March, 1942.

15th March, 1942

N. S. Reddy.	T. K. Narayanan.
M. A. Haq.	A. Ahmed.
J. N. Mukherjee.	P. K. K. Menon.
B. Bhattacharyya.	K. V. Pillai.
K. C. Mukherjee.	H. P. Mehta.
S. M. Khan.	S. Bynyan.

A. Haq.

16th March, 1942

M. M. Singh Roy.	R. C. Mitra.
P. Ramamurti.	N. G. Kar.

B. Mahadevan.

H. L. Marathe. Dated 17th March, 1942.

RETIREMENTS

Lieutenant-Colonel K. S. Thakur. Dated 2nd April, 1942.

Lieutenant-Colonel H. S. Anand, Professor of Physiology, K. E. Medical College, Lahore, who was on military duty since 15th July, 1941, has been invalided out of the service, with effect from the 13th February, 1942.

The following retirement, with gratuity, is permitted :—

INDIAN LAND FORCES

(*Short Service Commission*)

Captain C. Parkash. Dated 7th March, 1942.

Notes

CLINICAL EXPERIENCES WITH UREA SULPHAZIDE

WE have received a copy of a brochure on *Clinical Experiences with Urea Sulphazide* by Union Drug Company, Limited.

It is a soluble azo-compound of the sulphanilamide group, in which sodium is replaced by urea.

The brochure is a collection of articles on the uses of the compound. Copies can be obtained free from Messrs. Union Drug Company, Limited, 285, Bow Bazar Street, Calcutta, by the members of the medical profession.

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- Cystitis
- Urethritis
- Pyuria in pregnancy

Gastrointestinal disturbances:
- Diarrhea
- Vomiting (with dehydration)

Diabetes

Febrile conditions:
- Infections
- Contagious diseases
- Toxemias

Dehydration

Inanition in the newborn

Surgery (especially adenoidectomy and tonsillectomy in children)

Liquid Citralka may be used to combat acidosis incident to large doses of sulfanilamide.

Liquid Citralka is not indicated for gastric hyperacidity.

- Liquid Citralka is supplied in 8-oz. bottles.

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